Federal Transit Administration

National Transit Summaries and Trends

For the 1995 National Transit Database Report Year

CAUTION: Extensive efforts have been made to assure the quality of information contained in this report. It is impossible, however, to achieve complete accuracy and consistency of the reported data. In addition, the reported data do not include all relevant information generally necessary to explain apparent differences in performance (e.g., information related to work rules, topography, climate, and unusual events such as strikes and service start-ups). Users of this report, therefore, should be careful not to draw unwarranted conclusions based solely on the data contained herein.

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National Transit Summaries and Trends

For the 1995 National Transit Database Report Year

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Table of Contents

Executive Summary 1

Introduction
- Publication Purpose 7
- Comments Welcome 7
- Report Organization and Overview 7
- Chapter 1 - National Transit Profile 7
- Chapter 2 - Capital Funding 7
- Chapter 3 - Operating Funding and Expenses 8
- Chapter 4 - Service Supplied and Consumed 8
- Chapter 5 - Safety 8
- Chapter 6 - Reliability and Maintenance Effectiveness 8
- Chapter 7 - Key Modal Characteristics and Uses of Capital Funds by Transit Agencies 8
- Inflation 8
- Rounding 8
- Number of Reporters 8
- Type of Service 9
- Exemption for Nine or Fewer Vehicles 10
- Calculation and Treatment of Joint Modal Expenses 11
- Performance Indicators 11
- Relative Impacts of the Data 11

Chapter 1 – National Transit Profile
- Introduction 13
- Service Consumption 13
- Service Supplied 13
- Financial Information 18
- Capital Data 18
- Modal Data 19

Chapter 2 – Capital Funding
- Introduction 21
- Chapter Organization 21
- Sources Of Capital Funds 21
- Distribution of Capital Funds by UZA Size and Source 22
- Uses of Capital Funds 23
- Current Infrastructure: Fixed Guideway Characteristics 24
- ADA Accessible Vehicles 25
- Spare Ratio 26
- Average Fleet Age 26

Non-Fixed Guideway Vehicles 27
New Vehicles Acquired 28

Chapter 3 – Operating Funding and Expenses
Introduction 31
Chapter Organization 31
Operating Funds Applied 31
Sources of Operating Funding 31
Passenger Fare Revenue to Operating Expense (Recovery Ratio) 32
Average Fare Revenue per Unlinked Passenger Trip 33
Average Subsidy per Unlinked Passenger Trip 34
Sources of Operating Funds Applied by UZA Size 34
Operating Expense 35
Operating Expense by Object Class 38
Operating Expense by Mode and Object Class 39
Operating Expense by Function and Object Class 39
Operating Expense by Mode and Function 41

Chapter 4 – Service Supplied and Consumed
Introduction 43
Chapter Organization 43
Vehicle Revenue Miles by Mode 44
Vehicle Revenue Hours by Mode 44
Vehicles Operated in Maximum Service by Mode 45
Service Supplied: Modal Comparison 45
Service Consumed: Unlinked Passenger Trips by Mode 46
Passenger Miles by Mode 47
Service Consumed: Modal Comparison 48
Performance Indicators 48
Service Efficiency: Operating Expense per Vehicle Revenue Mile by Mode 49
Cost Effectiveness: Operating Expense per Unlinked Passenger Trip by Mode 49
Operating Expense per Passenger Mile by Mode 50
Service Effectiveness: Unlinked Passenger Trips per Vehicle Revenue Mile by Mode 50
Average Operating Speed 51
Service Supplied and Consumed by Mode for Purchased Transportation 1994-1995 52
Vehicle Revenue Miles by UZA Size and Mode 53
Vehicles Operated in Maximum Service by UZA Size and Mode 54
Unlinked Passenger Trips by UZA Size and Mode 54
Passenger Miles by UZA Size and Mode 55
Operating Expense per Vehicle Revenue Mile by UZA Size and Mode 57
Operating Expense per Unlinked Passenger Trip by UZA Size and Mode 57
Operating Expense per Passenger Mile by UZA Size and Mode 58
Average Operating Speed by UZA Size and Mode 58

Chapter 5 – Safety
Introduction 59
Chapter Organization 59
General Notes 59
Total Reported Incidents by Mode 60
Total Fatalities by Mode 60
Total Injuries by Mode 61
Total Property Damage by Mode 61
Total Incidents per Vehicle Mile by Mode 61
Total Injuries per Unlinked Passenger Trips 62
Fatalities per Unlinked Passenger Trips 62
Collision and Non-Collision Incidents by Mode 63

Chapter 6 – Reliability and Maintenance Effectiveness
Introduction 64
Chapter Organization 64
General Notes 64
Maintenance Performance Measures: Maintenance Expense per Vehicle Mile 64
Vehicle Revenue Miles per Mechanical Roadcall 65

Chapter 7 – Key Modal Characteristics and Uses of Capital by Transit Agencies
Introduction 67
Chapter Organization 67
Bus Agencies 67
Heavy Rail Agencies 71
Commuter Rail Agencies 72
Light Rail Agencies 75
Demand Response Agencies 77
Tolleybus Agencies 81
Ferryboat Agencies 82
Automated Guideway Agencies 83

List of Exhibits

Executive Summary

Exhibit E-1 Capital Investment: Funding Sources 1991-1995 2
Exhibit E-2 Capital Investment: Uses of Capital Funds by Mode-1995 2
Exhibit E-3 Operating Funding Sources 1991-1995 3
Exhibit E-4 Fare Revenues and Subsidy per Passenger 1991-1995 4
Exhibit E-5 Operating Expense by Mode 1991-1995 4
Exhibit E-6 Service Supplied: Vehicle Revenue Miles 1991-1995 5
Exhibit E-7 Service Consumption: Unlinked Passenger Trips 1991-1995 6

Introduction

Exhibit I-1 Number of Modes Reported by Type of Service 1991-1995 9
Exhibit I-2 Relative Impacts of the Data (Percentage) by UZA Size 1995 12

Chapter 1 - National Transit Profile

Exhibit 1-1 National Transit Profile 1995 14

Chapter 2 – Capital Funding

Exhibit 2-1 Sources of Capital Funds 1991-1995 21
Exhibit 2-2 Uses of Capital Funds by UZA Size and Source 1995 22
Exhibit 2-3 Uses of Capital Funds by Mode 1995 23
Exhibit 2-4 Fixed Guideway Miles by Mode (Actual Segments) 1991-1995 25
Exhibit 2-5 Percentage of ADA Accessible Vehicles by Mode 1994-1995 26
Exhibit 2-6 Spare Ratio by Mode 1991-1995 26
Exhibit 2-7 Average Fleet Age by Mode 1991-1995 27
Exhibit 2-8 Non-Fixed Guideway Vehicles by Vehicle Type and Mode 1995 27
Exhibit 2-9 Non-Fixed Guideway Vehicles by Vehicle Type and Propulsion 28
Exhibit 2-10 New Vehicles Acquired by Mode 1990-1994 28
Exhibit 2-11 Vehicles by Age and Vehicle Type 1995 29

Chapter 3 – Operating Funding and Expenses

Exhibit 3-1 Sources of Operating Funds 1991-1995 32
Exhibit 3-2 Ratio of Passenger Fare Revenue to Operating Expense 1991-1995 33
Exhibit 3-3 Passenger Fare Revenue per Unlinked Passenger Trip 1991-1995 33
Exhibit 3-4 Operating Subsidy per Passenger 1995 34
Exhibit 3-5 Sources of Operating Funds by UZA Size 1995 35
Exhibit 3-6 Operating Expense by Mode and Reconciling Cash Expenditures 1991-1995 36
Exhibit 3-7 Distribution of Total Operating Expense by Mode 1995 37
Exhibit 3-8 Distribution of Total Operating Expense by Object Class 1995 38
Exhibit 3-9 Operating Expense by Mode and Object Class and Reconciling Cash Expenditures 1995 39

Exhibit 3-10 Operating Expense by Function and Object Class and Reconciling Cash Expenditures 1995 40
Exhibit 3-11 Operating Expense by Mode and Function 1995 42

Chapter 4 – Service Supplied and Consumed
Exhibit 4-1 Vehicle Revenue Miles by Mode 1991-1995 44
Exhibit 4-2 Vehicle Revenue Hours by Mode 1991-1995 44
Exhibit 4-3 Vehicles Operated in Maximum Service by Mode 1991-1995 45
Exhibit 4-4 Modal Comparison of Service Supplied 1995 46
Exhibit 4-5 Unlinked Passenger Trips by Mode 1991-1995 47
Exhibit 4-6 Passenger Miles by Mode 1991-1995 47
Exhibit 4-7 Distribution of Unlinked Passenger Trips and Passenger Miles With Average Trip Length by Mode 1995 48
Exhibit 4-8 Operating Expense per Vehicle Revenue Mile by Mode 1991-1995 49
Exhibit 4-9 Operating Expense per Unlinked Passenger Trip by Mode 1991-1995 49
Exhibit 4-10 Operating Expense per Passenger Mile by Mode 1991-1995 50
Exhibit 4-11 Unlinked Passenger Trips per Vehicle Revenue Mile by Mode 1991-1995 51
Exhibit 4-12 Average Operating Speed by Mode 1995 52
Exhibit 4-13 Service Supplied and Consumed for Purchased Transportation 1995 53
Exhibit 4-14 Vehicle Revenue Miles by UZA Size and Mode 1995 54
Exhibit 4-15 Vehicles Operated in Maximum Service by UZA Size and Mode 1995 54
Exhibit 4-16 Unlinked Passenger Trips by UZA Size and Mode 1991-1995 55
Exhibit 4-17 Passenger Miles by UZA Size and Mode 1991-1995 56
Exhibit 4-18 Operating Expense per Vehicle Revenue Mile by UZA Size and Mode 1995 57
Exhibit 4-19 Operating Expense per Unlinked Passenger Trip by UZA Size and Mode 1995 57
Exhibit 4-20 Operating Expense per Passenger Mile by UZA Size and Mode 1995 58
Exhibit 4-21 Average Operating Speed by UZA Size and Mode 1995 58

Chapter 5 – Safety
Exhibit 5-1 Total Reported Incidents by Mode Directly Operated Service 1991-1995 60
Exhibit 5-2 Total Fatalities by Mode Directly Operated Service 1991-1995 60
Exhibit 5-3 Total Injuries by Mode Directly Operated Service 1991-1995 61
Exhibit 5-4 Total Property Damage by Mode Directly Operated Service 1991-1995 61
Exhibit 5-5 Total Incidents per Vehicle Mile by Mode Directly Operated Service 1995 62
Exhibit 5-6 Total Injuries per Unlinked Passenger Trips Directly Operated Service 1995 62
Exhibit 5-7 Total Fatalities per Unlinked Passenger Trips Directly Operated Service 1995 63
Exhibit 5-8 Collision and Non-Collision Incidents by Mode Directly Operated Service 1995 63

Chapter 6 – Reliability and Maintenance Effectiveness
Exhibit 6-1 Maintenance Expense per Vehicle Mile by Mode 1991-1995 65
Exhibit 6-2 Vehicle Revenue Mile per Mechanical Roadcall Directly Operated Service 1991-1995 66

Exhibit 6-3 Ratio of Vehicle Maintenance Expenses to Total Operating Expenses Directly Operated Service 1991-1995 66

Chapter 7 - Key Modal Characteristics and Uses of Capital of Transit Agencies

Exhibit 7-1 Key Bus Operating Characteristics of Transit Agencies 1995 68
Exhibit 7-2 Key Bus Performance Indicators of Transit Agencies 1995 69
Exhibit 7-3 Key Bus Infrastructure Characteristics of Transit Agencies 1995 70
Exhibit 7-4 Uses of Bus Capital Funds by Transit Agencies 1995 70
Exhibit 7-5 Key Heavy Rail Operating Characteristics of Transit Agencies 1995 71
Exhibit 7-6 Key Heavy Rail Performance Indicators of Transit Agencies 1995 72
Exhibit 7-7 Key Heavy Rail Infrastructure Characteristics of Transit Agencies 1995 72
Exhibit 7-8 Uses of Heavy Rail Capital Funds by Transit Agencies 1995 73
Exhibit 7-9 Key Commuter Rail Operating Characteristics of Transit Agencies 1995 73
Exhibit 7-10 Key Commuter Rail Performance Indicators of Transit Agencies 1995 74
Exhibit 7-11 Key Commuter Rail Infrastructure Characteristics of Transit Agencies 1995 75
Exhibit 7-12 Uses of Commuter Rail Capital Funds by Transit Agencies 1995 76
Exhibit 7-13 Key Light Rail Operating Characteristics of Transit Agencies 1995 76
Exhibit 7-14 Key Light Rail Performance Indicators of Transit Agencies 1995 77
Exhibit 7-15 Key Light Rail Infrastructure Characteristics of Transit Agencies 1995 78
Exhibit 7-16 Uses of Light Rail Capital Funds by Transit Agencies 1995 78
Exhibit 7-17 Key Demand Response Operating Characteristics of Transit Agencies 1995 79
Exhibit 7-18 Key Demand Response Performance Indicators of Transit Agencies 1995 80
Exhibit 7-19 Key Demand Response Infrastructure Characteristics of Transit Agencies 1995 80
Exhibit 7-20 Key Trolleybus Operating Characteristics of Transit Agencies 1995 81
Exhibit 7-21 Key Trolleybus Performance Indicators of Transit Agencies 1995 81
Exhibit 7-22 Key Trolleybus Infrastructure Characteristics of Transit Agencies 1995 82
Exhibit 7-23 Uses of Trolleybus Capital Funds by Transit Agencies 1995 82
Exhibit 7-24 Key Ferryboat Operating Characteristics of Transit Agencies 1995 83
Exhibit 7-25 Key Ferryboat Performance Indicators of Transit Agencies 83
Exhibit 7-26 Key Ferryboat Infrastructure Characteristics of Transit Agencies 84
Exhibit 7-27 Uses of Ferryboat Capital Funds by Transit Agencies 1995 84
Exhibit 7-28 Key Automated Guideway Characteristics of Transit Agencies 1995 85
Exhibit 7-29 Key Automated Guideway Performance Indicators of Transit Agencies 1995 85
Exhibit 7-30 Key Automated Guideway Infrastructure Characteristics of Transit Agencies 85
Exhibit 7-31 Uses of Automated Guideway Capital Funds by Transit Agencies 86

Executive Summary

Introduction

The 1995 National Transit Summaries and Trends (NTST) provides an overview of the national mass transit industry. The NTST highlights the aggregate financial and operational characteristics and trends of mass transit for the 5-year period 1991-1995. The NTST provides key statistics and performance indicators for the United States' transit industry.

The chapters include:

- National Transit Profile
- Capital Funding
- Operating Funding and Expenses
- Service Supplied and Consumed
- Safety
- Reliability and Maintenance
- Key Modal Characteristics and Uses of Capital Funds by Transit Agencies

This executive summary presents seven exhibits showing key data elements reported to the National Transit Database. Each exhibit is depicted graphically.

The exhibits included are:

Exhibit E1 – Capital Investment: Funding Sources 1991-1995

Exhibit E2 – Capital Investment: Uses of Capital Funds by Mode-1995

Exhibit E3 – Operating Funding Sources 1991-1995

Exhibit E4 – Fare Revenues and Subsidy per Passenger 1991-1995

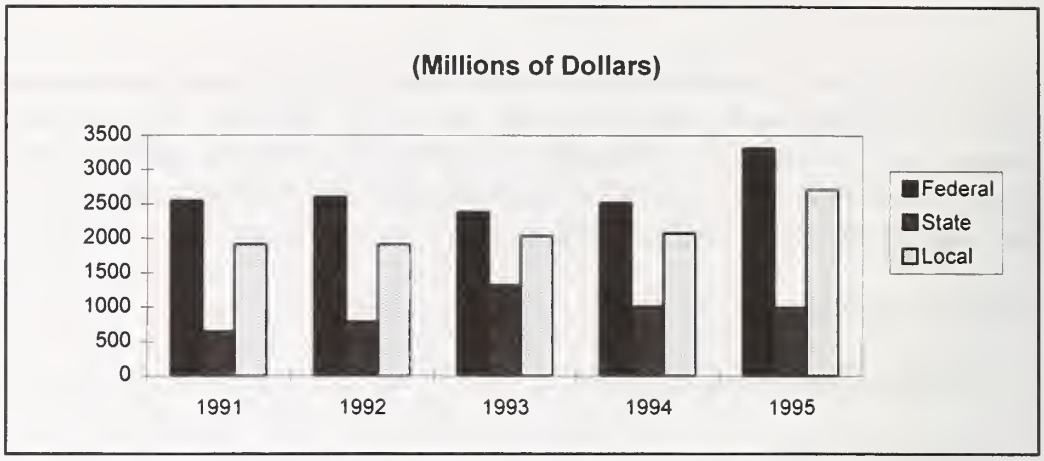
Exhibit E5 – Operating Expense by Mode 1991-1995

Exhibit E6 – Service Supplied: Vehicle Revenue Miles 1991-1995

Exhibit E7 – Service Consumed: Unlinked Passenger Trips 1991-1995

Exhibit E-1

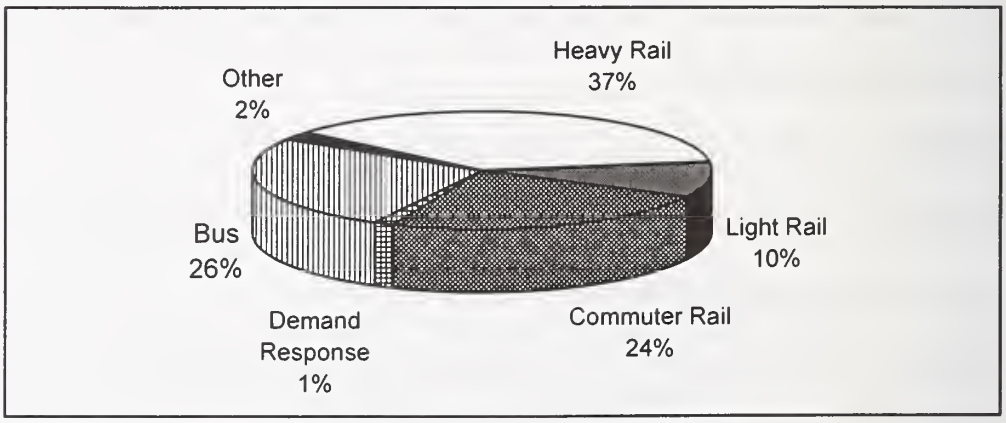
Capital Investment: Funding Sources 1991-1995



- Capital investment in transit reached a historic record in 1995 with over $7 billion invested in capital projects.
- Federal capital dollars accounted for 47.3 percent of the total invested in 1995, while local and state capital dollars accounted for 38.6 and 14.1 percent of the total invested.
- Over 91 percent of capital funds was expended in agencies located in urbanized areas over 1 million population.

Exhibit E-2

Capital Investment: Uses of Capital Funds by Mode - 1995



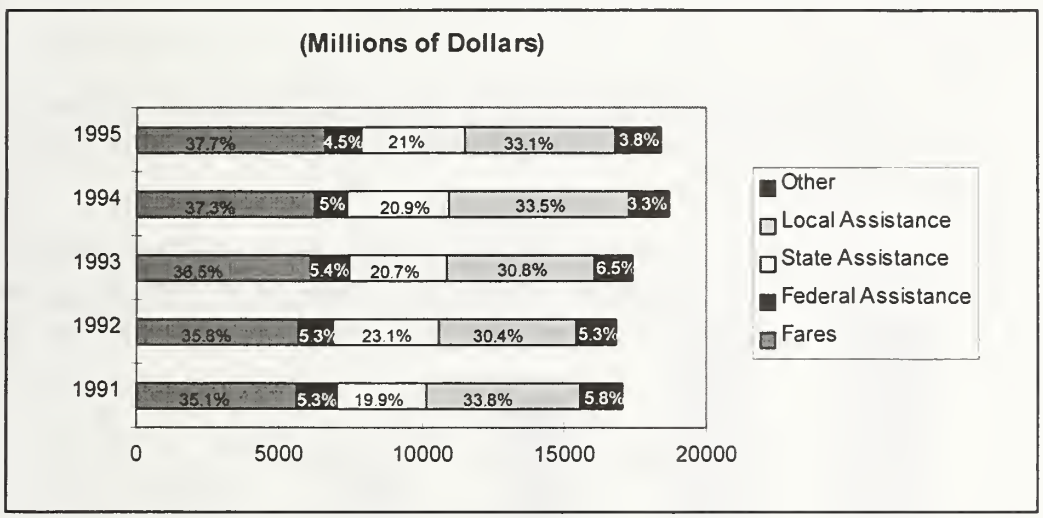
- Heavy Rail is the mode with the largest percentage of capital invested. Heavy Rail and other rail modes expended most of its capital dollars in facilities and other transit infrastructure. Capital investments in rolling stock represent only 9.9 percent of the total capital invested in Heavy Rail.

- Rail modes consumed over 70 percent of capital funds applied in 1995. They carried 35 percent of the total ridership and generated 28.3 percent of all revenue miles in 1995. Thirty-nine transit agencies operated at least one rail mode in 1995. This represents 8 percent of all agencies reporting to the National Transit Database.

- Bus is the individual mode with the second largest capital expenditure. Capital investments in bus are primarily in rolling stock at 47.7 percent.

- Bus carried 61 percent of the ridership and generated 58.2 percent of all revenue miles in 1995. Four hundred and twenty-two transit agencies operated bus in 1995, or 90.4 percent of all NTD reporters.

Operating Funding Sources 1991-1995 **Exhibit E-3**



- Total operating funding applied decreased by nearly 1 percent in 1995.

- Total subsidies applied decreased slightly at the federal, state and local levels.

- Total fare revenues increased by 0.2 percent and represented 37.7 percent of all operating funds applied in 1995.

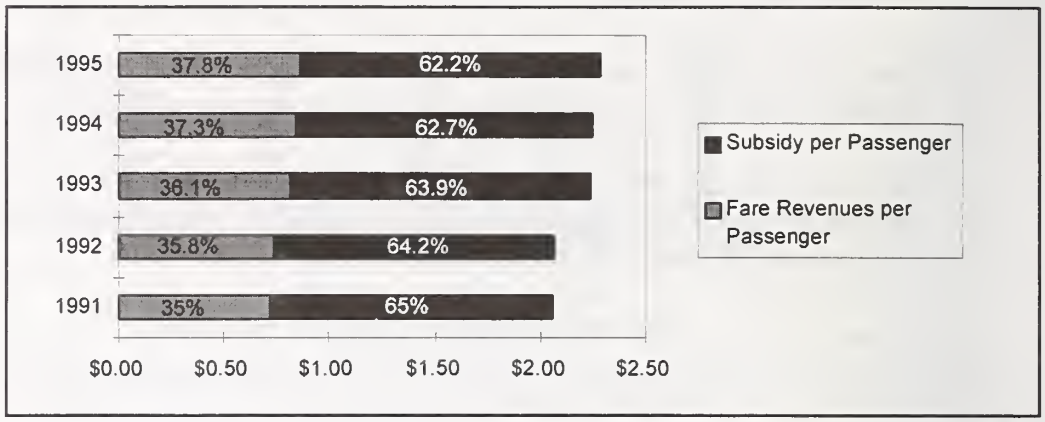
- Over 77 percent of transit agencies did not have decreased operating funding in 1995. These agencies accounted for 49.8 percent of the total operating funding, 42.7 percent of the total ridership and 56.4 percent of all service supplied in 1995.

- *Twenty-three* percent of transit agencies had decreased operating funding in 1995. These agencies accounted for 57.2 percent of the total ridership and 43.5 percent of all service supplied in 1995.

- Large agencies located in the northeast and on the west coast accounted for most of the net loss in operating funding in 1995 ($170.4 million).

Exhibit E-4

Fare Revenues and Subsidy per Passenger 1991-1995

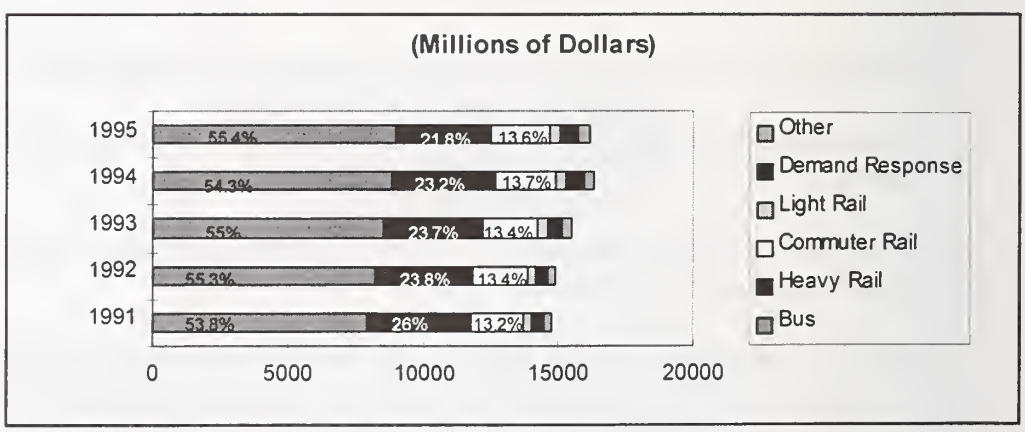


- Total operating funding applied per passenger has a trend of increase for the 1991-1995 timeframe, ranging from $2.06 in 1991 to $2.28 in 1995, or a 10.7 percent increase.

- The participation of fare revenues in the total funding applied per passenger has increased from 35 percent in 1991 to 37.8 percent in 1995. Therefore, the share of fare revenues per passenger is 8 percent higher in 1995 than in 1994.

Exhibit E-5

Operating Expenses by Mode 1991-1995



- Operating expense had a trend of increase between 1991 and 1994 and decreased for the first time in 1995 by 0.8 percent.
- Decrease in operating expense affected primarily large transit agencies operating rail modes which had decreases for heavy rail (6.9 percent), commuter rail (0.9 percent) and light rail (9 percent).
- Bus is the mode with the highest percentage of operating expenses at 55.4 percent, and it shows a trend of increase in operating expense for the 1991-1995 timeframe.
- Bus had a 1.3 percent increase in operating expenses in 1995 compared to 1994. This increase represents the smallest annual increase during the 1991-1995 time frame.

Service Supplied: Vehicle Revenue Miles 1991-1995

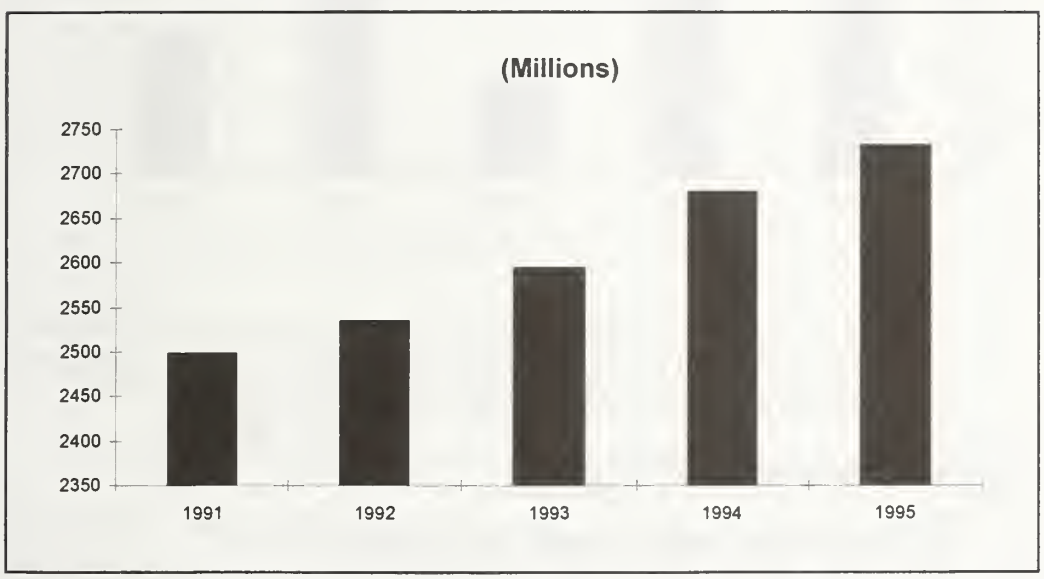


Exhibit E-6

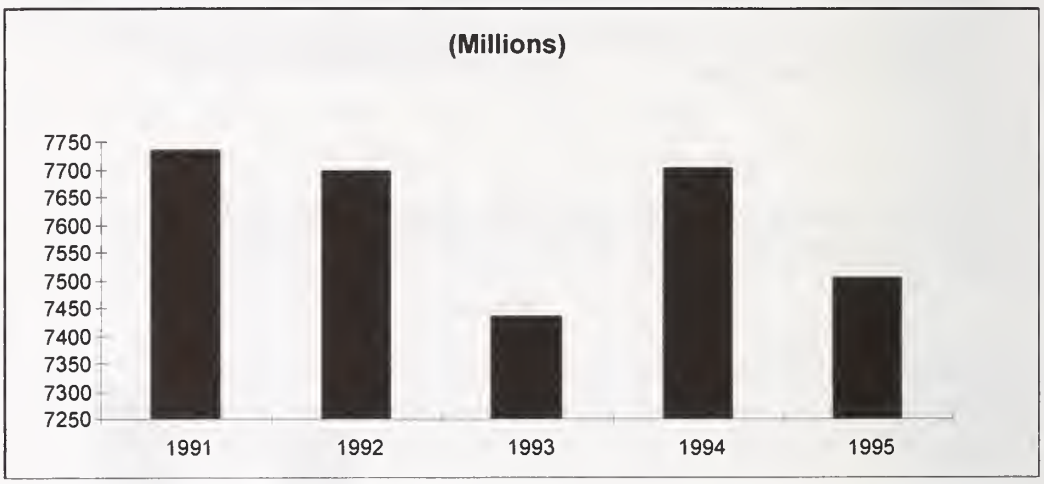
- Vehicle revenue miles increased consistently during the 1991-1995 time frame. Vehicle revenue miles is nearly 2 percent higher in 1995 compared to 1994, despite the overall decrease in operating funds applied and operating expenses.
- The overall increase in vehicle revenue miles during the 1991-1995 time frame is 9.3 percent.

Comparing Vehicle Revenue Miles in 1995 to 1994:

- Vehicle revenue miles decreased in 39 percent of the transit agencies in 1995 and these agencies account for 26.4 percent of the total revenue mileage in 1995.
- Vehicle revenue miles increased in 61 percent of the transit agencies in 1995, and these agencies account for 73.6 percent of the total revenue mileage in 1995.

Exhibit E-7

Service Consumption: Unlinked Passenger Trips 1991-1995



- Unlinked passenger trips had a trend of decrease between 1991 and 1993 with a loss of nearly 4 percent during that time frame. Ridership increased by 3.6 percent in 1994 and decreased by 2.6 percent in 1995.

Comparing Ridership in 1995 to 1994:

- Unlinked passenger trips decreased by 2.6 percent in 1995.
- Ridership decreased in 46.4 percent of the transit agencies in 1995, and these agencies account for 67.7 percent of the total ridership in 1995.
- Ridership did not decrease in 53.6 percent of the transit agencies in 1995, and these agencies account for 32.3 percent of the total ridership in 1995.

Introduction

Publication Purpose

The 1995 *National Transit Summaries and Trends (NTST)* highlights aggregated financial and operational characteristics and trends for key statistics and performance indicators of the nation's mass transit industry. The *NTST* is developed from the National Transit Database (NTD) and thus represents a portion of the 1995 National Transit Database Annual Report. This is the sixth annual edition of the *NTST* which provides a picture of the mass transit industry in 1995. The *NTST* also provides 5-year compilations of selected transit industry statistics. The *NTST* is a reference for transit professionals, researchers, and policy makers, and it describes the current condition of urban mass transportation in the United States.

Comments Welcome

Suggestions and comments regarding this document are encouraged.

Report Organization and Overview

The *NTST* offers a national transit profile organized in the following chapters:

- National Transit Profile
- Capital Funding
- Operating Funding and Expenses
- Service Supplied and Consumed
- Safety
- Reliability and Maintenance Effectiveness
- Key Modal Characteristics and Uses of Capital Funds by Transit Agencies

Chapter 1: National Transit Profile

The National Transit Profile provides aggregate operating statistics and financial data for the transit industry. The data are presented at aggregated modal level and a financial and operating summary of all modes combined is provided. Only the most relevant modes in the NTD are included in the national transit profile. They are Bus, Heavy Rail, Commuter Rail, Light Rail, and Demand Response.

Chapter 2: Capital Funding

This chapter discusses sources of capital funding and its uses (rolling stock, facilities, and other uses) by mode and size of UZA. In addition, the implications of capital investments in new rolling stock acquired and on average fleet age as well as exhibits stratifying vehicle inventory data by fuel type and vehicle size are presented.

Chapter 3: Operating Funding and Expenses

Sources of operating funding and the cost of operating service are discussed in this chapter. A reporting change introduced in 1994 requires agencies to report only the operating funds expended during the report year. Operating funds received during the report year that did not result in an expense in that year went unreported. Operating expenses are allocated by mode, function (vehicle operations, vehicle maintenance, non-vehicle maintenance, and general administration), and object class. Object classes are groupings of expenses based upon goods or services purchased. They include salaries and wages, fringe benefits, services, material and supplies, purchased transportation, and other expense categories.

Chapter 4: Service Supplied and Consumed

This chapter provides an analysis of service efficiency and effectiveness and discusses both the amounts and kinds of transit services provided and utilized. Performance measures evaluate the efficiency and effectiveness of transit service by reflecting miles, hours, and service consumption data to operating expenses.

Chapter 5: Safety

This chapter discusses data measures designed to offer insight into safety related issues regarding transit.

Chapter 6: Reliability and Maintenance Effectiveness

Measures of reliability of service and effectiveness of vehicle maintenance are presented in this chapter. Data about maintenance expense and service interruptions are also included.

Chapter 7: Key Modal Characteristics and Uses of Capital Funds by Transit Agencies

This chapter provides data on operations, performance, infrastructure, and uses of capital by transit agencies at modal level.

Inflation

All revenue and cost information are represented in dollars as actually reported. Data has not been adjusted to reflect the impact of inflation. The consumer price index (urban) increased 12 percent between 1991 and 1995.

Rounding

Rounding may lead to minor variations in total values from one table to another for similar data or may lead to instances where percentages may not add to 100.

Number of Reporters

The NTD records reporters in several ways. One way records the actual number of individual reporters in each report year. For the 1995 Report Year, the number of individual reporters is 535. Of this number, 55 transit agencies received exemptions from detailed reporting and 13 agencies were deleted following an extensive review process. Thus, 467 individual reporters are included in the full database. Data from agencies granted exceptions is included only for the transit agency mode(s) and type(s) of service provided, and the UZAs served. See **Exhibit I-1.**

Number of Modes Reported by Type of Service
1991-1995

Exhibit I-1

Type of Service	1991	1992	1993	1994	1995
Bus					
Directly Operated	356	339	352	357	352
Purchased Transportation	102	107	118	126	129
Total	458	446	470	483	481
Heavy Rail					
Directly Operated	12	13	14	14	14
Purchased Transportation	-	-	-	-	-
Total	12	13	14	14	14
Commuter Rail					
Directly Operated	10	9	9	9	7
Purchased Transportation	8	9	10	10	10
Total	18	18	19	19	17
Light Rail					
Directly Operated	14	15	17	19	19
Purchased Transportation	1	1	-	-	-
Total	15	16	17	19	19
Demand Response					
Directly Operated	170	173	185	201	209
Purchased Transportation	219	226	253	263	267
Total	389	399	438	464	476
Other					
Directly Operated	40	41	36	39	36
Purchased Transportation	13	18	19	20	18
Total	53	59	55	59	54
Total					
Directly Operated	602	590	613	639	637
Purchased Transportation	343	361	400	419	424
Total	945	951	1,013	1,058	1,061

Type of Service

Most of the data in the NTD are organized by mode and type of service. There are two types of service: purchased transportation and directly operated service.

A transportation service is purchased transportation in the NTD when a contractual relationship exists between at least two entities. The contractual relationship is for the provision of public transportation service. It includes payments or accruals to sellers, fare revenues retained by the seller, and other expenses incurred by the buyer (purchaser) for items such as contract administration and services and materials (advertising, customer information services, fuel maintenance, etc.). Generally, the entity buying the service is a public agency and the seller is a private organization.

The other type of service in the NTD is directly operated service. The service provided by a transit agency is considered directly operated when the transit agency is the entity responsible for generating the service to the public. Directly operated service is provided by either a public or private entity. In the NTD, a typical transit agency has both directly operated service and purchased transportation.

Some purchased transportation data is reported from a directly operated perspective, especially when the number of vehicles operated in maximum service exceeds 100. In this case, the seller submits a full report for the purchased service. Therefore, directly operated and purchased transportation are two non-mutually exclusive categories of service. A discussion of purchased transportation in the NTD is presented in Chapter 4, **Exhibit 4-13**.

The number of agencies reporting directly operated and purchased transportation by mode from 1991 to 1995 is presented in **Exhibit I-1.**

As shown in **Exhibit I-1**, the number of modes reporting by type of service has grown by 12.3 percent since 1991. In addition, the number of reporters for Bus declined from 1991 to 1992 and increased from 1992 to 1995. The decline between 1991 and 1992 is primarily due to several reporting changes implemented to reduce reporting burden and develop more consolidated reporting. The number of Demand Response reporters has steadily increased each year. There are 22.4 percent more Demand Response modes in 1995 than in 1991. Light Rail experienced a growth in the number of agencies reporting this mode, with 4 new systems built between 1991 and 1995. Heavy Rail remains steady in the number of agencies reporting this mode between 1993 and 1995. Commuter Rail declined in the number of agencies in 1995, but this resulted from reporter consolidation and is not indicative of reduced service supplied or consumed. This exhibit shows that, among rail modes, Light Rail has been the primary choice for providing mass transit in areas where Bus was the primary mass transit mode.

Exemption for Nine or Fewer Vehicles

Agencies operating nine or fewer vehicles in maximum service are exempted from reporting to the NTD. Fifty-five agencies were exempted in the 1995 Report Year compared with 31 agencies for the 1994 Report Year. Reporters receiving this exemption do not submit data and therefore are not included in the database for capital, operating funding, operating expenses, and non-financial data. The implications of the missing data for these agencies is not relevant in the aggregate given the small amount of service supplied and consumed by agencies operating nine or less vehicles in maximum service. Please note that the NTD includes some agencies operating less than nine vehicles in maximum service. The reporting exemption is optional for qualified agencies.

Calculation and Treatment of Joint Modal Expenses

Prior to 1992, joint modal expenses were allocated by function only and were included as part of the "other" object class. Since 1992, reporters fully allocated joint expenses for each mode by function and object class. Operating funding reported in 1995 are the funds that resulted in expenses in 1995. This is a reporting change introduced in 1994. Therefore, except for reconciling cash expenditures, operating funding and operating expenses should be similar for the NTD 1995 Report Year.

Performance Indicators

The *NTST* presents several performance measures as indicators of efficiency and effectiveness. These indicators include:

- Operating expense per vehicle revenue hour
- Operating expense per vehicle revenue mile
- Unlinked passenger trips per vehicle revenue hour
- Unlinked passenger trips per vehicle revenue mile
- Operating expense per unlinked passenger trip
- Operating expense per passenger mile

Relative Impacts of the Data

The data in the NTD is highly concentrated in large urbanized areas (UZAs) as seen in **Exhibit I-2.** This concentration is not surprising given the nature of public mass transit, which provides public transportation services in densely populated areas. Over 87 percent of all data on service consumed is reported by agencies in UZAs with over 1 million population. In addition, 87.9 percent of operating expenses and 91.9 percent of capital funds expended were reported by agencies in these large population centers. Agencies located in large UZAs (over 1 million population) have a smaller share of service supplied than mid-size and small UZAs due to differences in the population density of large and small UZAs. Agencies located in large UZAs are also less dependent on operating subsidies than agencies in small UZAs. This becomes evident upon comparison of the percentage of total operating funds applied (88 percent) to the percentage of fares (93 percent) for agencies in large UZAs. Uses of Capital shows that while rolling stock is the major capital item for agencies in small UZAs, facilities and other transit infrastructure investments are made almost entirely in agencies located in large UZAs.

Exhibit I-2

Relative Impacts of the Data (Percentage) by UZA Size
1995

	Under 200,000	200,000 to 1 Million	Over 1 Million
Service Consumed			
Passenger Miles	2.5%	7.1%	90.4%
Unlinked Trips	3.0%	9.0%	87.9%
Service Supplied			
Vehicle Revenue Miles	6.6%	14.0%	79.4%
Vehicle Revenue Hours	6.9%	14.8%	78.3%
Vehicles Oper. Max. Service	13.0%	15.4%	71.6%
Operating Funds Total	3.2%	8.8%	88.0%
Passenger Fares	1.8%	5.1%	93.0%
Operating Expenses Total	3.3%	8.8%	87.9%
Capital Funds Total	1.9%	6.2%	91.9%
Uses of Capital Funds			
Rolling Stock	4.7%	13.1%	82.2%
Facilities and Other	1.0%	3.9%	95.2%

National Transit Profile

Introduction

This chapter discusses the data included in **Exhibit 1-1**, the National Transit Profile, which provides an overview of the mass transit industry in the United States by displaying aggregated data for 1995. These data include the following:

- Sources of operating and capital funding
- A summary of operating expenses
- Uses of capital funds
- Service supplied and consumed

This information is also given for each of the five major modes of service: Bus, Heavy Rail, Commuter Rail, Light Rail, and Demand Response. Additionally, performance indicators for each mode are graphically depicted and show measures of service and cost effectiveness and efficiency.

Service Consumption

Service Consumption data includes passenger miles and unlinked passenger trips. Passenger miles and unlinked passenger trips are generally determined through sampling. Each transit agency reporting to the National Transit Database is required to report these data annually, and any sampling procedure should meet a minimum 10 percent tolerance for a 95 percent confidence level. Depending on the size and location of a transit agency, the sampling procedure should be carried out every year, every three years or every five years. Large agencies are required to sample annually. Agencies not required to sample every year determine passenger miles for non-mandatory sampling years using the sampling year's trip length factor. This trip length factor is defined as the ratio between passenger miles and unlinked passenger trips. These agencies may also report for a non-mandatory sampling year the figure for passenger miles determined in a mandatory sampling year.

Service Supplied

Service Supplied data includes vehicle revenue miles and hours, vehicles operated in maximum service and vehicles available for maximum service. Revenue miles and hours include the miles and hours that a vehicle travels when in revenue service. A vehicle is in revenue service when it is available to the public and there is a reasonable expectation of carrying passengers. Vehicles operated in maximum service and vehicles available for maximum service are the number of revenue vehicles operated/available to meet the annual maximum service requirement. In the National Transit Profile, vehicles available for maximum service are reported as total fleet.

Exhibit 1-1

National Transit Profile 1995

General Information (System Wide)

Service Consumption (millions)	
Annual Passenger Miles	37,970.6
Annual Unlinked Trips	7,503.7
Average Weekday Unlinked Trips	26.1
Average Saturday Unlinked Trips	13.0
Average Sunday Unlinked Trips	8.0

Service Supplied	
Annual Vehicle Revenue Miles (millions)	2,732.4
Annual Vehicle Revenue Hours (millions)	183.3
Total Fleet	94,158
Vehicles Operated in Maximum Service	73,948
Base Period Requirement	33,037

Vehicles Operated in Maximum Service

Directly Operated	Vehicles	Agencies
Bus	40,266	326
Heavy Rail	7,973	14
Other	1,827	36
Light Rail	746	19
Demand Response	3,325	192
Commuter Rail	3,891	7
Total	**58,028**	**594**

Purchased Transportation	Vehicles	Agencies
Bus	3,311	121
Heavy Rail	0	0
Other	2,587	18
Light Rail	0	0
Demand Response	9,500	246
Commuter Rail	522	10
Total	**15,920**	**395**

Financial Information (System Wide)

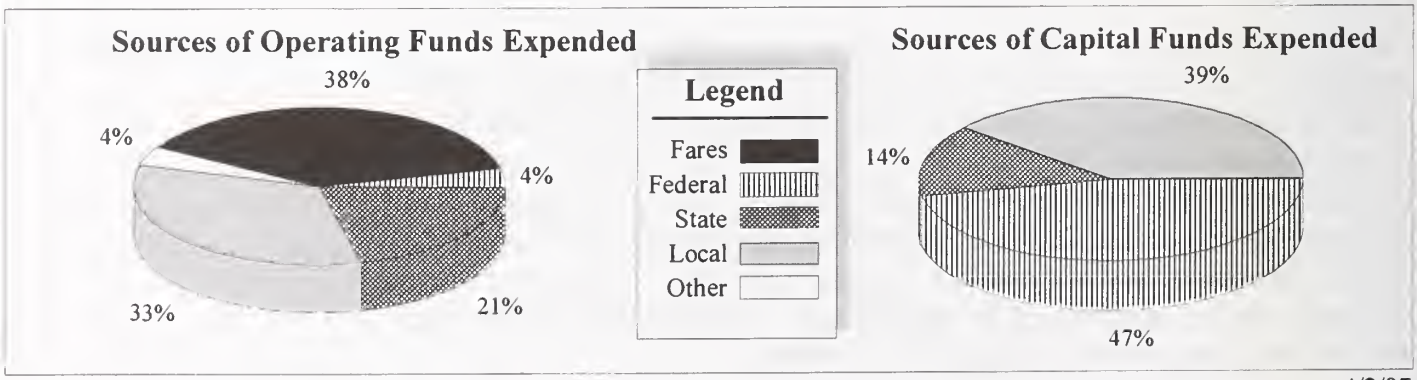
Sources of Operating Funds Expended (millions)	
Passenger Fares	$6,478.9
Local Funds	5,677.7
State Funds	3,598.6
Federal Assistance	767.8
Other Funds	651.2
Total Operating Funds Expended	**$17,174.3**

Summary of Operating Expenses (millions)	
Salaries/Wages/Benefits	$12,085.6
Materials & Supplies	1,511.6
Purchased Transportation	1,075.5
Other Expenses	1,508.7
Total Operating Expenses	**$16,181.6**
Reconciling Cash Expenditures (millions)	$1,047.1

Sources of Capital Funds Expended (millions)	
Local Funds	$2,705.5
State Funds	989.2
Federal Assistance	3,313.7
Total Capital Funds Expended	**$7,008.4**

Uses of Capital Funds (millions)

	Rolling Stock	Facilities and Other	Total
Bus	$877.4	$962.6	$1,840.0
Heavy Rail	253.1	2,307.4	2,560.5
Other	62.5	92.3	154.8
Light Rail	70.7	615.0	685.7
Demand Response	60.7	17.6	78.3
Commuter Rail	427.0	1,262.2	1,689.1
Total	**$1,751.4**	**$5,257.1**	**$7,008.4**



32

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National Transit Profile 1995 (continued)

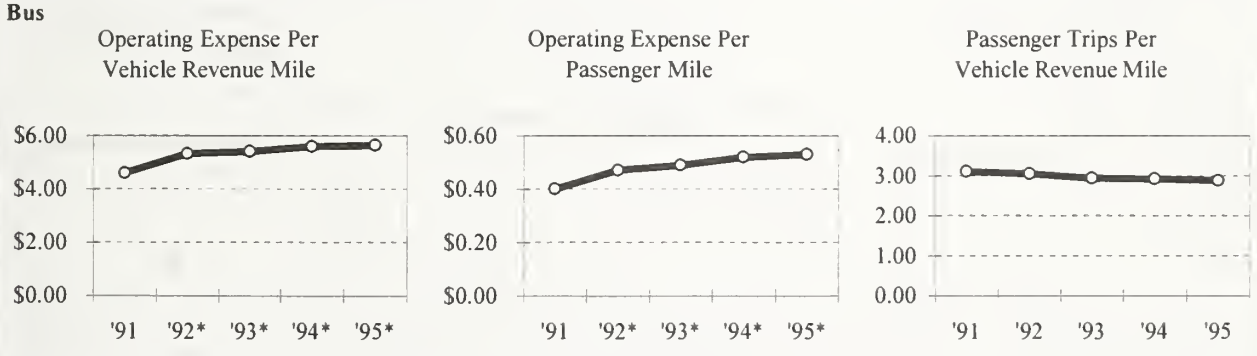
Characteristics

	Bus	Heavy Rail
Operating Expense (millions)	$8,972.2	$3,522.9
Capital Funding (millions)	$1,840.0	$2,560.5
Annual Passenger Miles (millions)	17,024.0	10,558.8
Annual Vehicle Revenue Miles (millions)	1,590.8	521.8
Annual Unlinked Trips (millions)	4,579.1	2,033.5
Average Weekday Unlinked Trips (millions)	16.3	6.8
Annual Vehicle Revenue Hours (millions)	123.4	25.2
Fixed Guideway Directional Route Miles	1,366.7	1,458.0
Total Fleet	53,741	10,166
Average Fleet Age in Years	8.4	19.3
Vehicles Operated in Maximum Service	43,577	7,973
Peak to Base Ratio	1.7	1.8
Percent Spares	23%	28%

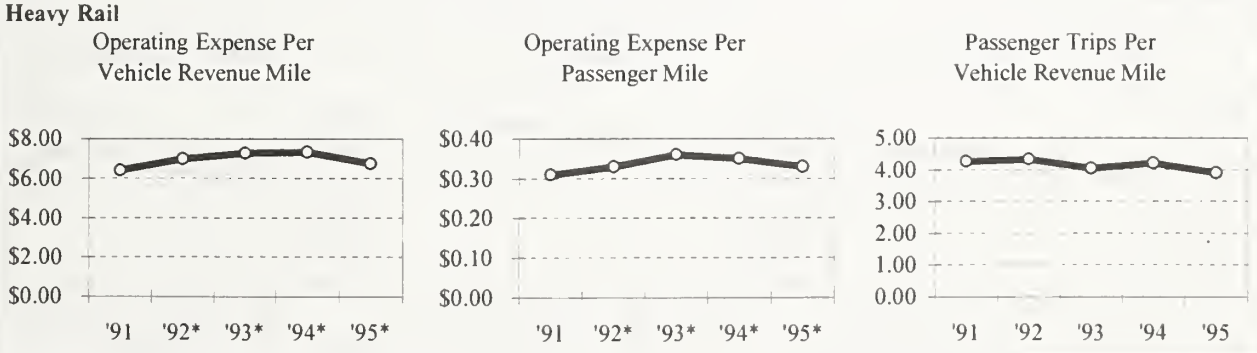
Performance Measures

Service Efficiency		
Operating Expense/Vehicle Revenue Mile	$5.64	$6.75
Operating Expense/Vehicle Revenue Hour	$72.74	$139.77
Cost Effectiveness		
Operating Expense/Passenger Mile	$0.53	$0.33
Operating Expense/Unlinked Passenger Trip	$1.96	$1.73
Service Effectiveness		
Unlinked Passenger Trips/Vehicle Revenue Mile	2.88	3.90
Unlinked Passenger Trips/Vehicle Revenue Hour	37.12	80.68

Bus



Heavy Rail

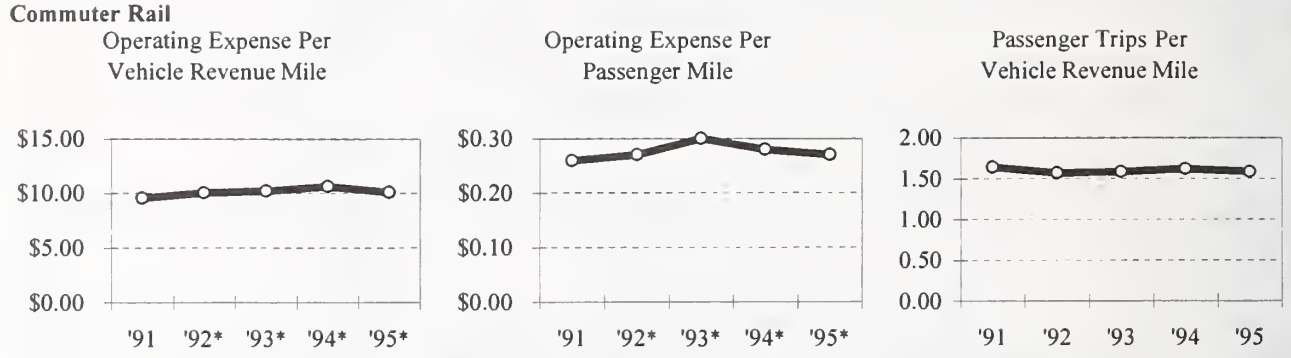


* Joint expenses eliminated and allocated to individual modes.

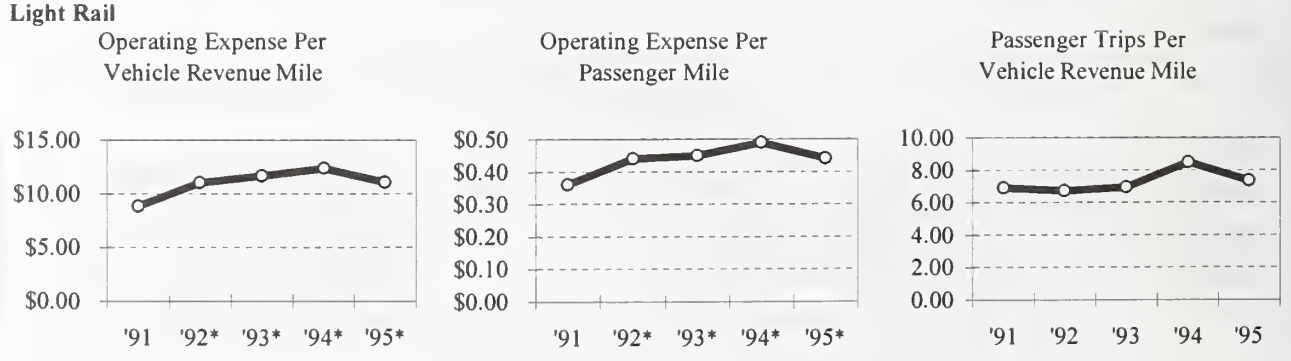
National Transit Profile 1995 (continued)

Characteristics	Commuter Rail	Light Rail
Operating Expense (millions)	$2,206.7	$375.2
Capital Funding (millions)	$1,689.1	$685.7
Annual Passenger Miles (millions)	8,244.0	858.7
Annual Vehicle Revenue Miles (millions)	217.8	33.9
Annual Unlinked Trips (millions)	343.5	249.3
Average Weekday Unlinked Trips (millions)	1.2	0.8
Annual Vehicle Revenue Hours (millions)	6.5	2.3
Fixed Guideway Directional Route Miles	6,161.7	567.6
Total Fleet	5,163	1,028
Average Fleet Age in Years	19.6	16.2
Vehicles Operated in Maximum Service	4,413	746
Peak to Base Ratio	2.1	1.7
Percent Spares	17%	38%
Performance Measures		
Service Efficiency		
Operating Expense/Vehicle Revenue Mile	$10.13	$11.07
Operating Expense/Vehicle Revenue Hour	$340.32	$160.33
Cost Effectiveness		
Operating Expense/Passenger Mile	$0.27	$0.44
Operating Expense/Unlinked Passenger Trip	$6.42	$1.51
Service Effectiveness		
Unlinked Passenger Trips/Vehicle Revenue Mile	1.58	7.35
Unlinked Passenger Trips/Vehicle Revenue Hour	52.98	106.52

Commuter Rail



Light Rail



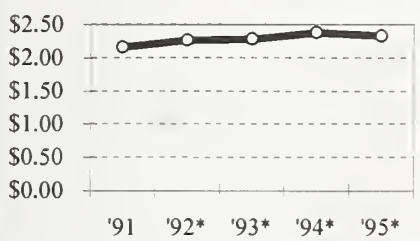
* Joint expenses eliminated and allocated to individual modes.

National Transit Profile 1995 (continued)

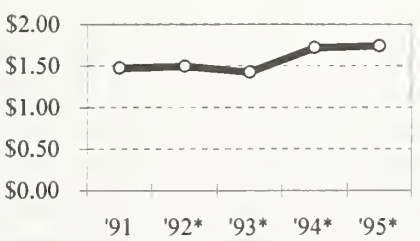
Characteristics	Demand Response
Operating Expense (millions)	$689.5
Capital Funding (millions)	$78.3
Annual Passenger Miles (millions)	397.2
Annual Vehicle Revenue Miles (millions)	297.3
Annual Unlinked Trips (millions)	54.9
Average Weekday Unlinked Trips (millions)	0.2
Annual Vehicle Revenue Hours (millions)	20.5
Fixed Guideway Directional Route Miles	N/A
Total Fleet	18,280
Average Fleet Age in Years	3.6
Vehicles Operated in Maximum Service	12,825
Peak to Base Ratio	N/A
Percent Spares	43%
Performance Measures	
Service Efficiency	
Operating Expense/Vehicle Revenue Mile	$2.32
Operating Expense/Vehicle Revenue Hour	$33.55
Cost Effectiveness	
Operating Expense/Passenger Mile	$1.74
Operating Expense/Unlinked Passenger Trip	$12.57
Service Effectiveness	
Unlinked Passenger Trips/Vehicle Revenue Mile	0.18
Unlinked Passenger Trips/Vehicle Revenue Hour	2.67

Demand Response

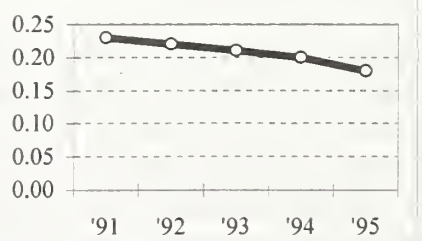
Operating Expense Per Vehicle Revenue Mile



Operating Expense Per Passenger Mile



Passenger Trips Per Vehicle Revenue Mile



Financial Information

Financial information includes data on the following:

- Operating funds applied
- Operating expenses
- Sources of capital funds expended
- Uses of capital funds

Operating funds applied include the funding sources for transit that resulted in expenditures. These data are not reported by mode. Operating expenses are reported by mode, function and object class. Function is the activity performed or cost center of a transit agency. There are four basic functions in the National Transit Database: vehicle operations, vehicle maintenance, non-vehicle maintenance and general administration. Object classes are groupings of expenses based upon goods or service purchased. For the National Transit Profile, object classes are grouped into 4 categories:

- Salaries/wages and benefits
- Materials and supplies
- Purchased transportation
- Other expenses

Purchased transportation data is reported in two different ways: detailed reporting, which shows purchased transportation expenses broken down by object class and function. In this case, the purchased transportation data is included in salaries, benefits and all other object classes. In many cases, however, purchased transportation expenses are reported as a lump sum under the object class "purchased transportation." Therefore, these data represent the portion of purchased transportation data not detailed by function and object class. The expense reported under object class "purchased transportation" in the summary page of the national transit profile is not the total expense for purchased transportation in the NTD. Readers should refer to Chapter 4, **Exhibit 4.13** for a complete discussion on the service supplied and consumed, and operating expense for purchased transportation.

Capital Data

Capital Data is divided into sources of capital funds expended and uses of capital. Only the dollars resulting in capital expenditures for a given year are reported. There are three major categories for capital expenditures: rolling stock, facilities and other. Rolling stock includes revenue vehicles used in providing transit service for passengers. Rolling stock expenditures include the

acquisition of new and replacement of revenue vehicles and major components and parts necessary for returning a revenue vehicle to an operable condition. This category also includes expenditures for rehabilitation, overhaul, or remanufacture of revenue vehicles.

Facilities and other capital expenditures include everything exclusive of rolling stock. This category includes items such as the following:

- Construction and rehabilitation of maintenance facilities
- Crime prevention and security equipment
- Line equipment and structures
- Signals and communications
- Power equipment and substations
- Transit malls and transfer facilities
- Intermodal terminals
- Shelters and passenger stations
- Depots and terminals
- High-occupancy vehicle facilities
- Transit ways and track
- Park-and-ride facilities
- Vehicle diagnostic equipment and real-time data acquisition systems
- Computer hardware and software
- Fare collection equipment

Modal Data

At modal level, **Exhibit 1-1** includes data items that are reported by mode, and performance measures are included. Please note that these measures are national averages and the variance in data distribution may be large depending on the mode. For example, the variance in performance measures of Bus and Demand Response are higher than for rail modes. Bus and Demand Response operate in all types of transit agencies under different conditions. Rail modes are operated almost exclusively in large metropolitan areas by large transit agen-

cies. This fact results in smaller variance in the performance measures for rail modes.

The data shows that 7.5 billion unlinked trips occurred in the nation in 1995, resulting in over 37.9 billion passenger miles. This indicates that the average trip is approximately 5 miles long. On an average weekday, 26.1 million unlinked trips are carried out. In terms of service consumption, 183.3 million revenue hours and 2,732.4 million revenue miles were produced, resulting in an average national speed of nearly 15 miles per hour. For an average trip length of 5 miles, the average time riding a transit vehicle is nearly 20 minutes.

This does not include the time required to access transit or the waiting time at stops or stations.

The total operating funding expended for the nation was nearly $17.2 billion which resulted in $16.2 billion in operating expenses and $1 billion in reconciling cash expenditures.

The average cost per unlinked trip was $2.16 and the average fare per unlinked trip $0.86 which represents nearly 39.8 percent of the total cost per passenger.

Capital investment consumed over $7 billion in 1995 for a historic record. Chapter 2 presents a discussion in capital funding and capital expenditures.

At the modal level, Bus and Heavy Rail are the modes with the highest levels of operating expense, and service supplied and consumed. However, these two modes show signs of stagnation in terms of service expansion and absorption of new riders. Both modes had a declining trend in the number of passenger trips per vehicle revenue mile between 1991 and 1995. Light Rail reversed the trend in passenger trips per vehicle revenue miles after a considerable expansion in service. This service expansion is supplied with the creation of new markets for this mode through implementation of four new systems during the 1991-1995 time frame. Commuter Rail displays steady behavior in terms of passenger trips per vehicle revenue mile. Demand Response has a clear trend of decrease for the same ratio. This resulted from demand increases requiring higher increases in the production of miles.

Chapters 3 and 4 present more analysis in operating data at the modal level.

Capital Funding

Introduction

Capital investment in transit reached a historic record in 1995, amassing nearly $7 billion. This represents an increase of 25.1 percent compared to 1994. Capital investment had a trend of increase from 1991 to 1993 with an increase of 12.5 percent over that period. After a small decline in 1994, the increase in 1995 is more than twice the increase observed between 1991 and 1993.

Chapter Organization

This chapter begins with a review of the sources of capital funding. It then discusses the uses of capital funds by mode and category of use. Finally, data on transit infrastructure and other variables directly affected by capital investments are presented.

Sources of Capital Funds

Federal capital assistance continues to be the single largest funding source for capital investment in transit infrastructure. Of the over $7 billion used in 1995 for capital investment in transit infrastructure expansion and rehabilitation, federal assistance accounted for nearly 47.3 percent. Local funds represented 38.6 percent and state funding contributed 14.1 percent of the capital assistance provided. The sources and amounts of capital funding for the 1991-1995 time frame are given in **Exhibit 2-1**. The contribution of Federal assistance had a trend of decline between 1991 and 1993, dropping from nearly 50 percent in 1991 to 41.6 percent in 1993. Starting in 1993, the trend reversed and the contribution of federal dollars to capital increased from 41.6 percent in 1993 to 47.3 percent in 1995. The contribution of local assistance follows the trend observed for federal assistance, dropping from 1991 to 1993 and increasing from 1993 to 1995. The local funds share remained between 35 and 39 percent between 1991 and 1995. State assistance had a trend exhibiting the reverse of the local and federal trends. The contribution of state funds to capital increased from 12.5 percent in 1991 to 23 percent in 1993. This represents an increase of 10.5 percent during those years. From 1993 to 1995, the contribution of state funds decreased from 23 percent in 1993 to 14.1 percent in 1995.

Exhibit 2-1

Sources of Capital Funds
(Millions)
1991-1995

	1991	1992	1993	1994	1995
Federal	$2,545.0	$2,598.7	$2,383.5	$2,518.1	$3,313.7
State	638.1	777.7	1,316.7	1,005.5	989.2
Local	1,914.2	1,906.2	2,033.4	2,074.8	2,705.5
Total	$5,097.3	$5,282.6	$5,733.6	$5,598.4	$7,008.4

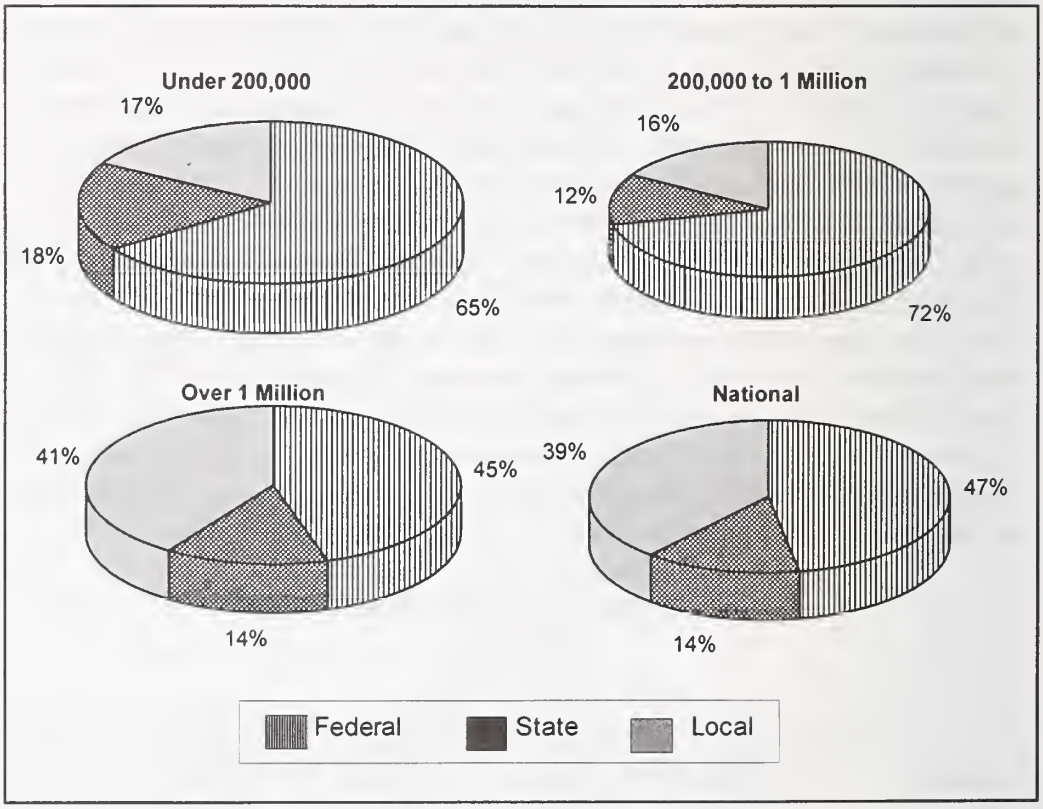
Distribution of Capital Funds by UZA Size and Source

Urbanized areas (UZAs) with a population exceeding 1 million account for nearly $6.4 billion, or 92 percent, of the capital investment made in the transit infrastructure in 1995. This is due to the substantial number of fixed guideway systems in place or being developed in the nation's large metropolitan areas. These systems require large fleets of vehicles to accommodate passenger needs, maintain significant capital assets, and provide sophisticated signaling and control systems and maintenance facilities.

As presented in **Exhibit 2-2**, large UZAs rely more heavily than mid-size and small UZAs on local funding sources to meet capital needs. Because of the substantial investment needed to maintain their transit infrastructures, large UZAs must commit more capital funds from local resources than mid-size and small UZAs, which have far less transit infrastructure. **Exhibit 2-2** also shows that the share of federal assistance among agencies located in small urbanized areas is higher than for agencies located in large, densely populated areas.

Exhibit 2-2

Uses of Capital Funds by UZA Size and Source
1995



Uses of Capital Funds

Uses of Capital Funds are identified by mode and category of use in **Exhibit 2-3.** The categories of use are rolling stock, facilities and other capital expenditures. The facilities and other capital categories comprise everything unrelated to rolling stock.

Exhibit 2-3

Uses of Capital Funds by Mode
(Millions)
1995

	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response	Other	Total
Rolling Stock	$877.4	$253.1	$427.0	$70.7	$60.7	$62.5	$1,751.4
Facilities	675.8	1,287.8	1,089.7	597.8	7.2	74.5	$3,732.8
Other Capital	286.8	1,019.6	172.5	17.1	10.4	17.8	$1,524.2
Total	$1,840.0	$2,560.5	$1,689.1	$685.7	$78.3	$154.8	$7,008.4

Rolling stock includes revenue vehicles which provide transit service for passengers. Rolling stock expenditures include the acquisition of new and replacement of revenue vehicles and major components and parts necessary for returning a revenue vehicle to an operable condition. This category also includes expenditures for rehabilitation, overhaul, or remanufacture of revenue vehicles.

Facilities and other capital expenditures include items such as the following:

- Construction and rehabilitation of maintenance facilities
- Crime prevention and security equipment
- Line equipment and structures
- Signals and communications
- Power equipment and substations
- Transit malls and transfer facilities
- Intermodal terminals
- Shelters and passenger stations
- Depots and terminals
- High-occupancy vehicle facilities
- Transit ways and track

- Park-and-ride facilities
- Vehicle diagnostic equipment and real-time data acquisition systems
- Computer hardware and software
- Fare collection equipment

In the aggregate, rolling stock represents 25 percent of capital expenditures, while facilities and other represent 75 percent. Rail modes consume the majority of capital expenditures with Heavy Rail, Commuter Rail, and Light Rail expending 70.4 percent of the capital investment in 1995.

Rail modes are primarily located in high density corridors in the largest metropolitan areas of the United States. The high levels of service supplied in these areas require large investments in items such as real-time data acquisition systems, complex maintenance facilities, passenger stations, intermodal terminals, and many other cost-intensive items. The nature of rail systems explains the smaller role of rolling stock share in the total capital expenditure of rail modes. Heavy Rail expended 9.9 percent of capital on rolling stock in 1995, while Commuter Rail and Light Rail expended 25.3 and 10.3 percent respectively.

Bus and Demand Response represent a different share in the distribution of capital expenditures among rolling stock, facilities, and other. Bus expended 47.7 percent of the capital invested on rolling stock, while Demand Response's share was 77.5 percent in 1995. Bus and Demand Response modes do not require the same level of investment in facilities and other as do rail modes; therefore, rolling stock is the main use of capital. Additionally, while rail modes are concentrated in large UZAs serving dense metropolitan areas, Bus systems operate in large, mid-size and small UZAs, and the total capital expenditure for Bus is distributed among several transit agencies across the nation. Mid-size and small UZAs contribute 22.5 percent of the uses of capital funding for Bus. The share of rolling stock in these areas is even higher than the share for large urbanized areas. This fact contributes to the overall larger share of rolling stock for Bus. Demand Response displays an even higher percentage of capital expenditures for rolling stock. This is because capital items, such as intermodal terminals and shelters, have some relevance for Bus systems, especially in large UZAs, but not for Demand Response systems.

Current Infrastructure: Fixed Guideway Characteristics

Exhibit 2-4 reflects the amount of fixed guideway segment miles by mode and demonstrates the continuing investment in the development and operation of fixed guideway systems. For the Bus mode, both exclusive and controlled access rights-of-way are included. The continuing investment in fixed guideway systems is most prominent for Bus, which has increased fixed guideway seg-

ment miles by 44.6 percent since 1991. The Bus fixed guideway segment miles reported are for the actual segments being operated. Many Bus fixed guideway segments are utilized by more than one transit agency. Each transit agency is required to report its operation on each segment. However, **Exhibit 2-4** only includes the actual segments as measured in miles.

Exhibit 2-4

Fixed Guideway Miles by Mode
(Actual Segments)
1991-1995

Mode	1991	1992	1993	1994	1995
Bus*	712.2	790.2	925.6	958.7	1,029.5
Heavy Rail	1,368.7	1,403.2	1,451.7	1,455.2	1,458.0
Commuter Rail	5,056.3	5,306.7	5,875.1	6,033.4	6,161.7
Light Rail	556.0	562.9	537.4	561.9	567.6
Demand Response	-	-	-	-	-
Other - Ferryboat	454.1	459.0	475.6	486.5	489.5
- Trolleybus	375.9	394.5	405.2	416.9	411.6
- All other	24.1	20.7	21.7	26.5	18.3
Total	8,547.3	8,937.2	9,692.3	9,939.1	10,136.2
* Exclusive plus Controlled Access Rights-of-Way.					

Increases were reported for Heavy Rail, Commuter Rail, and Light Rail. These increases reflect existing systems' expansion with the opening of new segments. Heavy Rail indicates an increase of 6.5 percent for the 1991-1995 time frame. The increase in Commuter Rail is more noticeable at 21.9 percent. Light Rail increased 2.1 percent during the 1991-1995 time frame and new starts occurred during this period. In 1994, new systems in Denver and St. Louis added new fixed guideway directional route miles for Light Rail. Demand Response is not a fixed guideway mode and therefore does not have any fixed guideway miles.

ADA Accessible Vehicles

The percentage of vehicles that are ADA accessible by mode is reflected in **Exhibit 2-5.** This exhibit is presented only for 1994 and 1995 because reporting ADA compliant vehicles only became a requirement in 1993. As the exhibit shows, Bus is the mode with the largest percentage of ADA accessible vehicles, with 60.2 percent. Heavy Rail follows closely with 79.3 percent. Bus has the highest increase in the percentage of ADA accessible vehicles in 1995 at 7.4 percent.

Exhibit 2-5

Percentage of ADA Accessible Vehicles by Mode
1994-1995

Mode	1994 Percent Available	1995 Percent Available
Bus	52.8	60.2
Heavy Rail	78.9	79.3
Commuter Rail	17.5	20.1
Light Rail	36.7	41.8
Demand Response	50.9	54.3

Spare Ratio

Exhibit 2-6 reflects the relative stability of spare ratios for each mode since 1991 except Light Rail and Demand Response. The spare ratio for Light Rail and Demand Response increased by 10.8 and 18 percent compared with 1994. These increases are related to the gap between the number of new vehicles acquired to meet projected ridership and the current real demand for Light Rail and Demand Response services. Demand Response is the mode with the highest spare ratio among modes with 42.5 percent, followed by Light Rail with 37.8 percent.

Exhibit 2-6

Spare Ratio by Mode
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	24.1%	22.5%	23.0%	22.9%	23.3%
Heavy Rail	25.5	25.1	25.6	24.2	27.5
Commuter Rail	16.9	17.6	18.2	17.9	17.0
Light Rail	25.3	32.4	28.8	34.1	37.8
Demand Response	25.4	25.5	35.1	36.0	42.5

Average Fleet Age

The average fleet age by mode for the 1991-1995 time frame is provided in **Exhibit 2-7**. The average fleet age increased in 1995 for all modes except Bus and Demand Response. The average fleet age for Heavy Rail, Light Rail and Commuter Rail increased 3.8, 2.1, and 13.3 percent, respectively. Please note that capital investment and uses of capital increased for all modes in 1995. The greater capital expenditures in rolling stock reflect decreased fleet age for Bus, and Demand Response.

Average Fleet Age by Mode
1991-1995

Exhibit 2-7

Mode	1991	1992	1993	1994	1995
Bus	8.0	8.3	8.3	8.5	8.4
Heavy Rail	17.0	17.8	17.8	18.6	19.3
Commuter Rail	17.0	18.5	18.8	19.2	19.6
Light Rail	16.0	17.1	14.3	14.3	16.2
Demand Response	4.0	3.4	3.7	3.7	3.6

Non-Fixed Guideway Vehicles

Non-fixed guideway vehicles by vehicle type and mode are presented in **Exhibit 2-8**. Over 86 percent of vehicles operated in Bus service are high capacity coaches seating more than 35 passengers. In contrast, 41.6 percent of Demand Response vehicles are vans, while over 36 percent are automobiles.

Non-Fixed Guideway Vehicles
by Vehicle Type and Mode
1995

Exhibit 2-8

Vehicle Type	Bus	Demand Response
Class A Bus (>35 Seats)	48,372	165
Class B Bus (25-35 Seats)	3,879	152
Class C Bus (<25 Seats)	1,792	3,828
Articulated Bus	1,773	15
School Bus	17	69
Van	191	7,918
Automobile	2	6,869
Total	56,026	19,016

Non-fixed guideway vehicles by vehicle type and propulsion are demonstrated in **Exhibit 2-9**. The exhibit shows that, while other forms of propulsion are growing in acceptance, diesel fuel-powered vehicles and gasoline-powered vehicles continue to account for all non-fixed guideway vehicles at 73.9 percent and 23.2 percent, respectively. Other means of propulsion, including electricity, liquefied natural gas, compressed natural gas, and liquefied petroleum gas, account for the remaining 2.8 percent.

Exhibit 2-9

Non-Fixed Guideway Vehicles by Vehicle Type and Propulsion
1995

Vehicle Type	Diesel Fuel	Gasoline	Other Fuels	Total
Class A Bus (>35 Seats)	47,316	84	1,137	48,537
Class B Bus (25-35 Seats)	3,872	58	105	4,035
Class C Bus (<25 Seats)	3,797	1,434	392	5,623
Articulated Bus	1,784	4	0	1,788
School Bus	68	18	0	86
Van	2,368	10,353	498	13,219
Automobile	32	6,680	160	6,872
Total	59,237	18,631	2,292	80,160

New Vehicles Acquired

A summary of new vehicles acquired by mode and type of service is presented in **Exhibit 2-10**. The data included in this exhibit covers the period between 1990 and 1994. It excludes the period from 1991 to 1995 as do the other exhibits of the *1995 NTST*. The reason is that since a transit agency's report year is based on its fiscal year, data for 1995 is limited to that portion of the manufacturer year included within the transit agency's fiscal year. For example, a transit agency with a fiscal year ending on June 30 will report only the new vehicles accepted and placed into service at the end of June 30. As a result, a vehicle manufactured in a given year but accepted after the transit agency's fiscal year ends, will not be reported until the subsequent report year for that transit agency. One half of all transit agencies conclude their fiscal year on June 30. As a result, current year data would understate the number of new vehicles for 1995.

Exhibit 2-10

New Vehicles Acquired by Mode
1990-1994

Modes/Type of Service	1990	1991	1992	1993	1994
Bus	4,075	2,851	3,026	2,747	3,116
Heavy Rail	14	0	215	226	86
Commuter Rail	46	110	94	66	85
Light Rail	32	14	34	38	-
Demand Response	1,297	1,369	1,134	1,746	2,534
Other	433	314	674	255	378
Total	5,897	4,658	5,177	5,078	6,199

The total number of vehicles acquired in 1994 increased by 22.1 percent in relation to 1993. This was the largest expansion in the number of new vehicles during the 1990-1994 time frame. New vehicles for Bus increased by 13.4 percent in 1994 when compared with 1993. Rail modes had a decrease in the

number of new vehicles in 1994. The most striking aspect of **Exhibit 2-10** is the increased Demand Response in 1994. New vehicles acquired increased by 45.1 percent in relation to 1993 for Demand Response. Bus accounted for 50.3 percent of all new vehicles acquired in 1994, while Demand Response accounted for 40.9 percent. Rail modes accounted for 2.7 percent of new vehicles for that year.

Another perspective on fleet age is provided in **Exhibit 2-11**. Avoid comparisons with **Exhibit 2-10** because **Exhibit 2-11** provides data by fleet type, while **Exhibit 2-10** provides information by mode. Each of the vehicle types enjoys a different life greatly influenced by use, weather, road conditions, maintenance practices, and local policies regarding rehabilitation and overhaul. Thus, the decline in average age is reflected in the number of standard Buses, small Buses, and vans that are 5 years of age or less, while the longer useful lives of Heavy Rail, Commuter Rail, and Light Rail vehicles are reflected by the large number of vehicles that are exceeding 15 years in age.

Exhibit 2-11

Vehicles by Age and Vehicle Type
1995

Vehicle Type	Age in Years						Total
	5 Years or Less	6-11 Years	12-15 Years	16-20 Years	21-25 Years	Over 25 Years	
Buses							
Class A Bus (>35 Seats)	14,785	17,680	10,242	2,739	540	369	46,355
Class B Bus (25-35 Seats)	1,952	1,201	495	171	42	18	3,879
Class C Bus (<25 Seats)	3,849	1,361	153	8	1	0	5,372
Articulated Bus	265	581	720	150	0	0	1,716
School Bus	45	37	1	1	0	0	84
Heavy Rail	528	2,661	1,136	1,436	774	3,622	10,157
Commuter Rail	613	852	500	821	1,470	1,361	5,617
Light Rail	119	310	218	196	0	112	955
Total	22,156	24,683	13,465	5,522	2,827	5,482	74,135

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Operating Funding and Expenses

Introduction

This chapter discusses patterns and trends of funding and expenditures for transit operations. Sources and levels of such funding are outlined, along with general trends for operating funding and expenses. Operating expenses are presented and discussed by mode and object class. The National Transit Database (NTD) uses accrual accounting as the basis for financial reporting. This means that funds reported are funds that were applied in the reporting year that resulted in liabilities for benefits received, regardless of whether or not payment of the expenditure was made during the reporting period.

Chapter Organization

The chapter begins with a review of the various funding sources. These sources include federal, state and local assistance, and passenger fare revenues. Operating expenses are then presented by mode and object class.

Operating Funds Applied

Operating funds include federal, state, and local financial assistance used for subsidizing the cost of operating transit services, as well as all categories of passenger fare revenues. Operating funds applied are unavailable by mode in the NTD. One of the reasons for this limitation is related to the integrated fare policy found in large transit systems operating more than one mode. Federal funds include general grants of operating assistance funds under 49 United States Code 5307 (formerly Section 9, of the Federal Transit Act, as amended) and other grants that have an operating assistance component. State funds include direct operating grants and assistance to transit agencies to encourage reduced fares for the elderly and physically challenged. Local assistance, besides municipal appropriations, incorporates funds available from dedicated taxes (property, sales, income, or other); tolls and fees; revenues accrued through purchased transportation agreements; and other non-fare-based revenue sources such as concessions and advertising.

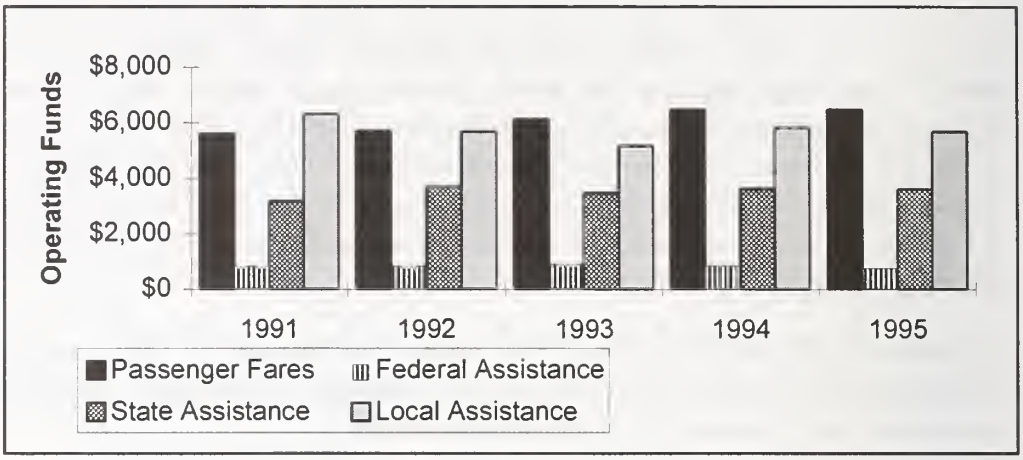
A reporting change was introduced in 1994 for operating funds applied. For 1994, only the funds expended in that reporting year were reported. Previously, all funds collected were reported regardless of whether or not they were expended in the reporting year. Therefore, variations in the funding amounts by source from 1993 to 1994 may be affected by this reporting change.

Sources of Operating Funding

As shown in **Exhibit 3-1**, passenger fares and local funds compose the bulk of operations funding. In 1995, fares contributed 37.7 percent of the funds applied for transit operations, while local assistance contributed 33.1 percent. State operating assistance accounted for 21 percent, while federal funds supplied 4.5 percent.

Exhibit 3-1

Sources of Operating Funds
(Millions)
1991-1995



Operating funds applied decreased 1.0 percent in 1995 compared with 1994. In the aggregate, there were decreases in subsidies for transit at the federal, state and local levels. The largest decrease was in federal assistance with 10.9 percent. Local and state assistance decreased by 2.4 and .7 percent respectively. The decrease in operating funds applied primarily affected some of the largest agencies in the northeast and west coast and was not a general phenomenon across transit agencies. In fact, most of the agencies (nearly 77 percent) had increases in operating funds in 1995.

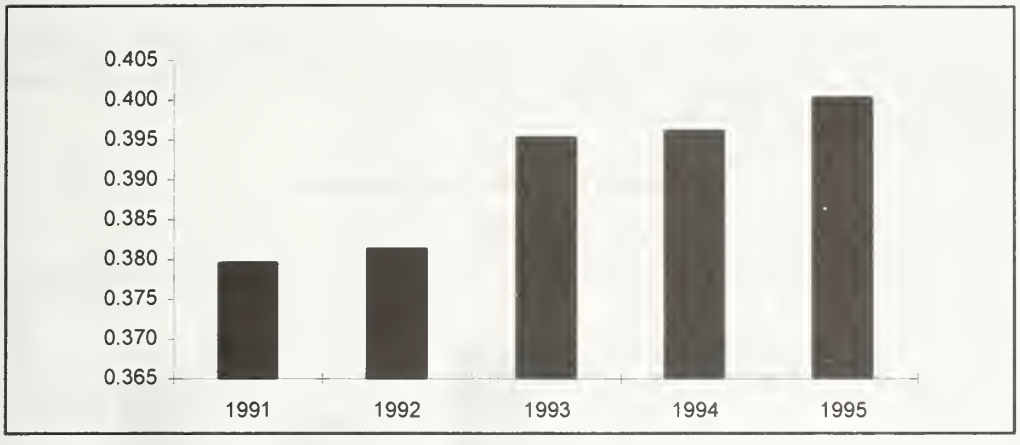
For the 1991-1995 time frame, passenger fares as a percentage of operating funds applied had a trend of slight increases, ranging from 35.1 percent in 1991 to 37.7 percent in 1995. The contribution of local assistance decreased from 33.8 percent in 1991 to 33.1 percent in 1995. Federal assistance accounted for 5.3 percent of the total operating funds in 1991 and decreased to 4.5 percent in 1995. State assistance, on the other hand, increased from 19.9 percent in 1991 to 21 percent in 1995.

Passenger Fare Revenue to Operating Expense (Recovery Ratio)

The recovery ratio for the 1991-1995 time frame is presented in **Exhibit 3-2.** The recovery ratio in the last 5 years shows a trend of slight increase, ranging from 38 percent in 1991 slightly more than 40 percent in 1995. The increase observed from 1994 to 1995 was not sufficient to cover the decrease in operating subsidies during the same period and consequently, the total operating funding applied to transit decreased in 1995. The recovery ratio has remained around 40 percent for the last three years, although it displayed a trend of slight increase between 1993 and 1995 (39.5 percent in 1993 and 40.0 percent in 1995).

Ratio of Passenger Fare Revenue to Operating Expense
1991-1995

Exhibit 3-2

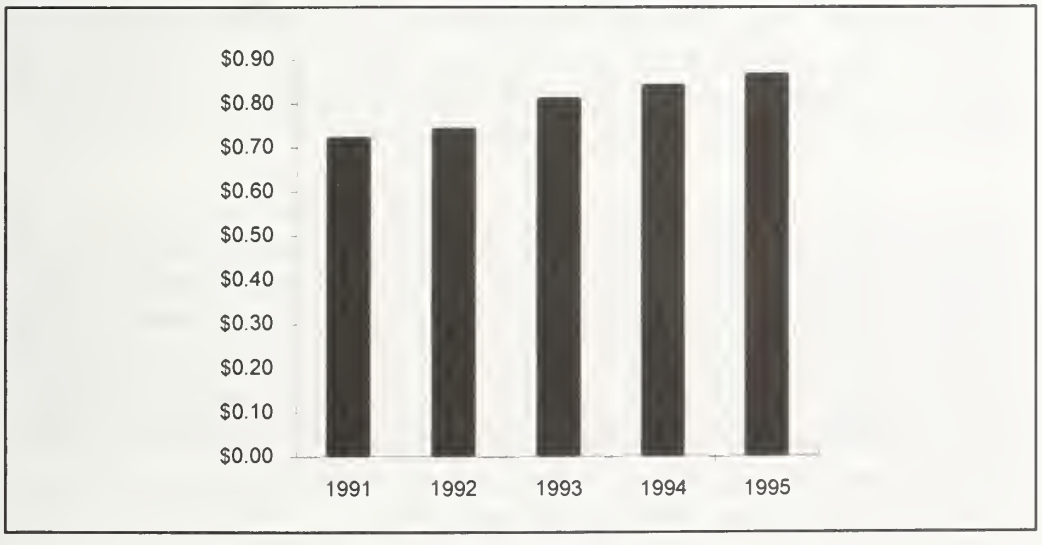


Average Fare Revenue per Unlinked Passenger Trip

Average fare revenue per unlinked passenger trip is depicted in **Exhibit 3-3**. The exhibit shows a trend of increase for the 1991-1995 time frame. However, the pace of increase has declined between 1992 and 1995. From 1992 to 1993, fares per unlinked passenger trips increased by 9.4 percent, the highest percent increase for the time period considered. From 1993 to 1994, the increase was 3.7 percent and 2.3 percent from 1994 to 1995. Ridership decreased 2.6 percent in 1995 while fare revenues increased by 0.2 percent, indicating that agencies suffering cuts in operating subsidies raised fares in order to fill the gap between their operating budgets and the resources available. This seems to have affected service consumption, as ridership decreased in 1995.

Passenger Fare Revenue per Unlinked Passenger Trip
1991-1995

Exhibit 3-3

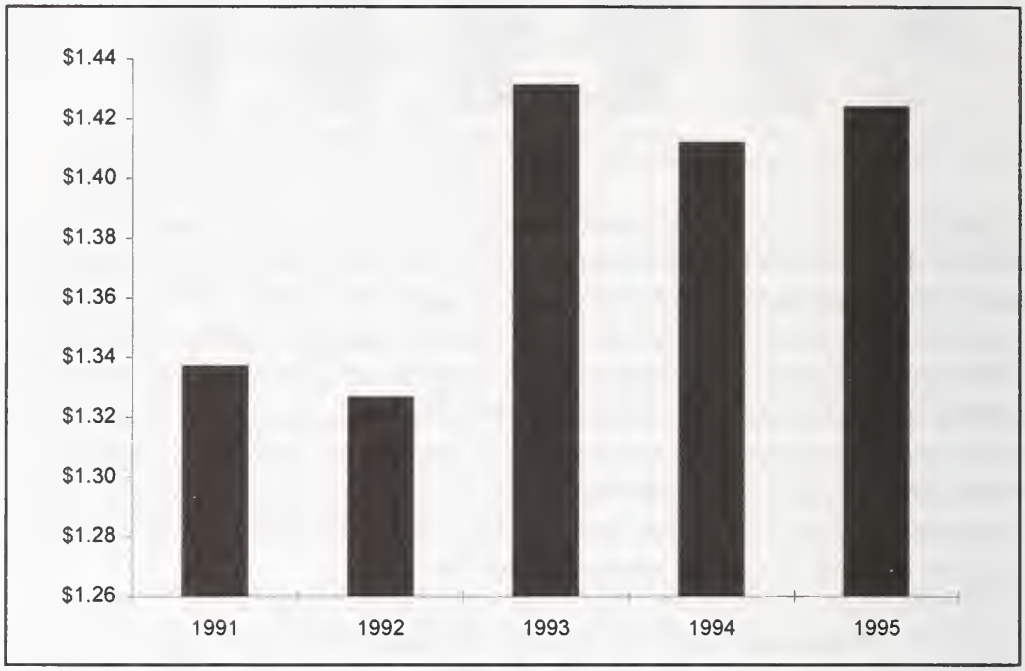


Average Subsidy per Unlinked Passenger Trip

Average subsidy per passenger is shown in **Exhibit 3-4**. The subsidy per unlinked passenger trip went from $1.34 per passenger in 1991 to $1.33 in 1992. However, the ratio jumped to $1.42 per passenger in 1993 and has remained over $1.40 per passenger since that time. The ratio for 1995 is slightly higher than for 1994, and reflects the fact that the percent loss in ridership surpassed the percent loss in subsidies.

Exhibit 3-4

Operating Subsidy per Passenger
1995



Sources of Operating Funds Applied by UZA Size

Distribution of transit operating funds applied from the sources available by size of urbanized area is outlined in **Exhibit 3-5**. The total operating funding in small and mid-size urbanized areas increased slightly in 1995 while large urbanized areas suffered cuts in operating funds. Small and mid-size urbanized areas are more dependent on subsidies than large areas.

While the trend in transit operating funds applied indicates a decreased role for federal funding and an increased role from other sources, a variation exists among the different sizes of urbanized areas. For small urbanized areas, federal funding decreased from 20.3 percent in 1991 to 18.3 percent in 1995. For mid-size urbanized areas, the decline in the share of federal funding was higher, from 13 percent in 1991 to 10.3 percent in 1995. State and local assistance's share also increased for small urbanized areas from 1991 to 1995, but at a slow rate. State and local assistance's shares grew by .2 and 1.8 percent respectively for small urbanized areas between 1991 and 1995.

Exhibit 3-5

Sources of Operating Funds by UZA Size
(Millions)
1995

UZA Size	Year	Passenger Fares	Federal Assistance	State Assistance	Local Assistance	Other	Total
Over 1 Million	1991	5,200.6	589.7	2,796.0	4,741.5	863.1	$14,190.9
	1992	5,297.0	586.7	3,335.0	4,100.9	773.9	$14,093.5
	1993	5,685.3	641.9	3,086.7	4,408.5	993.8	$14,816.2
	1994	6,017.6	591.9	3,218.3	4,945.1	516.9	$15,289.8
	1995	6,027.5	511.0	3,184.6	4,796.7	586.6	$15,106.3
200,000 to 1 Million	1991	305.6	168.6	270.3	509.6	46.2	$1,300.3
	1992	303.6	165.4	232.5	579.5	49.7	$1,330.7
	1993	320.0	168.7	273.8	588.7	70.0	$1,421.2
	1994	328.3	164.5	276.5	694.3	40.0	$1,503.6
	1995	333.5	155.6	281.2	698.6	44.1	$1,512.8
Under 200,000	1991	$93.3	$91.7	$107.2	$140.5	$19.8	$452.5
	1992	96.7	97.0	113.2	152.2	24.6	$483.7
	1993	111.7	102.5	114.6	168.3	23.4	$520.5
	1994	120.5	105.1	131.9	176.0	17.7	$551.2
	1995	117.9	101.3	132.9	182.3	20.5	$554.9
Total	1991	$5,599.4	$850.0	$3,173.5	$5,391.7	$929.1	$15,943.7
	1992	$5,697.3	$849.1	$3,680.6	$4,832.6	$848.2	$15,907.8
	1993	$6,117.1	$913.0	$3,475.1	$5,165.5	$1,087.2	$16,757.9
	1994	$6,466.4	$861.5	$3,626.7	$5,815.4	$574.7	$17,344.7
	1995	$6,478.9	$767.8	$3,598.6	$5,677.7	$651.2	$17,174.3

For large urbanized areas, a decline in the share of federal funding occurred, while the contribution of state funds displayed the same growth trend for small and large urbanized areas. Local assistance decreased, contributing 31.7 percent of the operating funds in 1995.

The contribution of passenger fares to total operating funds applied has different trends depending on the urbanized area's size. For small urbanized areas, the share of passenger fares increased 0.6 percent from 1991 to 1995. In 1991, passenger fares represented 20.6 percent of the total operating funds applied, and this figure increases to 21.2 percent in 1995. For mid-size urbanized areas, there is a decrease in the share of passenger fares for the 1991-1995 time frame. While passenger fares accounted for 23.5 percent of the operating funds in 1991, this figure dropped in 1995 to 22 percent with a net decrease of nearly 1.5 percent. For large urbanized areas, the contribution of passenger fares increased from 36.7 percent in 1991 to nearly 40 percent in 1995.

Operating Expense

The total operating expenses for 1995 decreased by 0.8 percent compared with 1994, resulting in over $16.2 billion in expenditures. Total operating funding for 1995 was over $17.2 billion and greater than the total operating expenses. This surplus resulted due to reconciling items that were reported but vary in treatment as a result of local ordinances and conditions. These items reconcile NTD expenses with public financial reports. Reconciling items include interest expenses,

leases and rentals, purchase and related parties lease agreements, and other. Depreciation is also reported as a reconciling item; however, since it is not a cash expenditure, it is excluded from the computation of the total reconciling cash expenditures. Total reconciling cash expenditures were over $1,047 million in 1995.

Total operating expenses increased 9.7 percent from 1991 to 1995 as shown in **Exhibit 3-6**. The consumer price index increased 12 percent for this period.

Exhibit 3-6

Operating Expense by Mode and Reconciling Cash Expenditures
(Millions)
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	$7,939	$8,267	$8,514	$8,860	$8,972
Heavy Rail	3,841	3,555	3,669	3,786	3,523
Commuter Rail	1,954	2,009	2,080	2,228	2,207
Light Rail	290	307	314	412	375
Demand Response	402	458	540	634	689
Other	325	344	356	401	415
Operating Expenses	$14,751	$14,940	$15,473	$16,320	$16,182
Reconciling Cash Expenditures	$908	$1,064	$914	$961	$1,047

Please note that operating expenses reported by agencies were not fully allocated by function and object class in 1991. Joint expenses were reported separately for agencies operating more than one mode in 1991, although multimodal agencies were encouraged to allocate joint expenses by function and object class to each mode to the maximum possible extent. Starting in 1992, full allocation of joint expenses by mode, function and object class became mandatory. Therefore, reported operating expense by mode from 1992 to present more accurately reflects the real costs of mass transit systems in the United States because joint expenses are fully allocated.

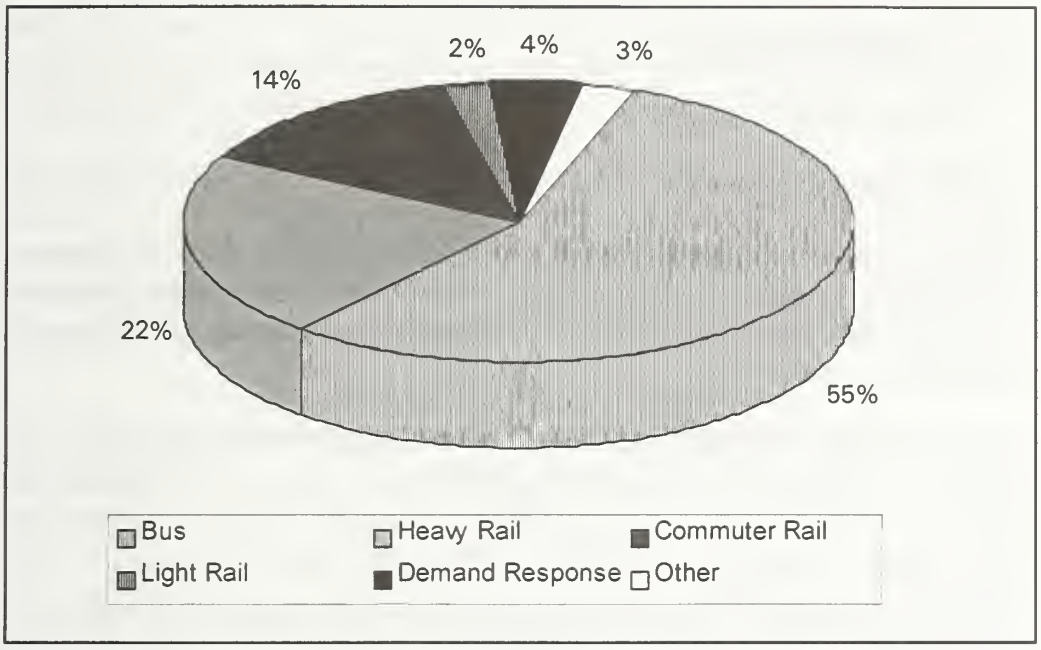
Upon examination of total operating expenses by mode, Demand Response and Light Rail experienced the highest increases for the 1991-1995 time frame. Operating expenses for Demand Response and Light Rail increased by over 71 and 29 percent respectively. These increases reflect expansion of the service supplied by these modes and implementation of new Light Rail systems across the nation. Commuter Rail experienced a small increase in operating expenses. Heavy Rail is the only mode with a decrease for the 1991-1995 time frame. The increase for Bus was 13 percent and reflects the moderate increase in service supplied for this mode in the last 5 years.

The contribution of each mode to total operating expense in 1995 is displayed in **Exhibit 3-7**. This exhibit reflects the dominance of Bus services, which accounted for 55 percent of the 1995 total operating expenses. Heavy Rail con-

sumed over 21 percent and Commuter Rail represents over 13 percent. Demand Response and Light Rail, while increasing in the amount of service supplied and in operating expense, represent over 4 percent and slightly over 2 percent, respectively, of total operating expenses for 1995.

Distribution of Total Operating Expense by Mode 1995

Exhibit 3-7



Operating expenses are reported by object class and function in the NTD. Object classes are groupings of expenses based upon goods or services purchased. The following are the items included as object classes in the NTD:

- Labor
- Fringe Benefits
- Services
- Materials and Supplies
- Utilities
- Casualty and Liability Costs
- Taxes
- Purchased Transportation

- Miscellaneous Expenses
- Expense Transfers

A function represents the activities associated with accomplishing a certain task. The following are the four functional categories used for reporting:

- Vehicle Operations
- Vehicle Maintenance
- Non-vehicle Maintenance
- General Administration

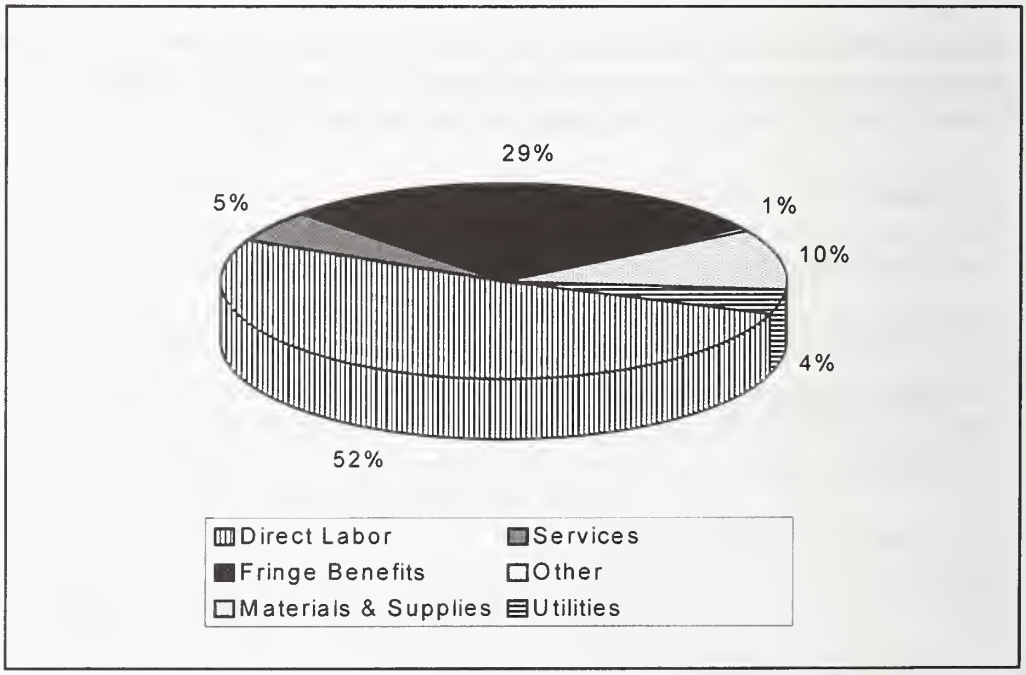
For this publication, casualty and liability costs, taxes, miscellaneous expenses, and expense transfers are grouped together as "other" when operating expense by object class is discussed. Operating expense by object class and function is compared by mode.

Operating Expense by Object Class

Labor and fringe benefits are the two largest classes of operating expense. As indicated in **Exhibit 3-8**, these two classes total 81 percent of operating expenses for 1995, showing the labor-intensive nature of the transit industry and underscoring the industry's sensitivity to labor cost increases.

Exhibit 3-8

Distribution of Total Operating Expense by Object Class 1995



Materials and supplies incorporates fuel and lubricants, tires and tubes, and other miscellaneous materials and supplies. This object class consumed 10 percent of the operating expenses.

The services object class includes professional and technical services, such as legal or audit fees, and contracted services, such as grounds maintenance or security. Services account for 5.1 percent of operating expense. Utilities represent 4 percent of the total operating expenses. These are costs associated with electricity (used to propel transit vehicles), and general building and station utilities. Other expenses comprise all remaining object classes, accounting for slightly under 1 percent combined.

Operating Expense by Mode and Object Class

The distribution of operating expense by mode and object class is displayed in **Exhibit 3-9**. Reconciling cash expenditures are not reported by mode. Direct labor and fringe benefits represent the largest expense classes for all modes. Purchased transportation manifests its significant role through the 62.8% of Demand Response operating expense attributable to this object class.

Exhibit 3-9

Operating Expense by Mode and Object Class and Reconciling Cash Expenditures (Millions) 1995

Object Class	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response	Other	Total
Direct Labor	$4,381.0	$1,991.3	$905.1	$172.4	$129.9	$185.7	$7,765.5
Fringe Benefits	2,350.2	1,123.4	623.1	97.1	49.7	76.7	$4,320.2
Materials and Supplies	977.0	244.4	185.1	33.6	24.3	47.2	$1,511.6
Utilities	113.0	321.2	136.4	27.7	3.3	9.0	$610.5
Services	439.0	139.6	127.3	30.5	15.7	20.8	$772.9
Other	320.5	(296.9)	35.7	14.0	33.2	18.8	$125.2
Operating Expenses - Directly Operated Service	$8,580.7	$3,522.9	$2,012.7	$375.2	$256.2	$358.2	$15,106.0
Purchased Transportation	391.5	0.0	194.0	0.0	433.2	56.8	$1,075.5
TOTAL	$8,972.2	$3,522.9	$2,206.7	$375.2	$689.4	$415.0	$16,181.5
Reconciling Cash Expenditures							$1,047.1

Materials and supplies account for 11.4 percent of Bus operating expense, significantly more than materials and supplies expense for other modes. Fuel costs, tires, and other general vehicle maintenance items that Bus service demands explain why Bus accounted for 64.6 percent of materials and supplies expense for all modes combined.

Operating Expense by Function and Object Class

Operating expense by function and object class is presented in **Exhibit 3-10**. The exhibit shows how operating expense is distributed over the functions and how allocations to object classes vary by function. Reconciling cash expenditures are included; however, the expenditures are not allocated by function and object class. Some explanation is needed for this exhibit.

Exhibit 3-10

Operating Expense by Function and Object Class and Reconciling Cash Expenditures (Millions) 1995

Object Class	Vehicle Operation	Vehicle Maintenance	Non-Vehicle Maintenance	General Administration	Total
Direct Labor	$4,351.5	$1,464.6	$996.6	$952.8	$7,765.5
Fringe Benefits	2,360.6	833.9	593.2	532.4	$4,320.2
Materials and Supplies	492.9	691.6	209.7	117.5	$1,511.6
Utilities	407.8	22.7	39.9	140.1	$610.5
Services	121.2	114.4	149.0	388.4	$772.9
Other	60.8	(16.7)	(189.5)	270.6	$125.3
Operating Expenses for Directly Operated Service	$7,794.8	$3,110.5	$1,798.9	$2,401.8	$15,106.0
Purchased Transportation					1,075.5
Total Operating Expense					$16,181.6
Reconciling Cash Expenditures					$1,047.1

Purchased transportation data not reported as directly operated includes a data subset of the NTD. These data are reported under a special object class "purchased transportation". While all expenses for directly operated service are detailed by object class and function, expenses for object class "purchased transportation" include only the total cost for the buyer for the purchased services. This expense is not allocated by function. It is a lump sum reflecting the total cost for the buyer. The *1995 Reporting Manual* instructs agencies to report this lump expense under vehicle operations and/or general administration. The majority of agencies report these data as the *1995 Reporting Manual* suggests, but a few agencies allocate object class "purchased transportation " expenses under vehicle maintenance and non-vehicle maintenance. Therefore, the resulting distribution of object class "purchased transportation" across functions does not reflect the real weight of each function in the total expense. Thus, only the directly operated component of the total operating expense can provide an accurate picture of the relative weight of each function. The 1995 NTD cannot provide the real distribution of expenses across functions for the whole aggregated data.

The allocation of operating expense by function and object class is displayed in **Exhibit 3-10**. Direct labor and fringe benefits represent a substantial amount of the expenses for vehicle operations and maintenance expenses. Over 86 percent of the total cost allocated to vehicle operations is expended with labor and fringe benefits, while the rates for vehicle maintenance and non-vehicle maintenance are 73.9 and 88.4 percent respectively. The share of labor and fringe benefits for general administration is 61.8 percent. This is smaller than the rates for vehicle and non-vehicle maintenance, but more than all other object classes combined, demonstrating the sensitivity of the transit industry to labor-related issues.

General administration reflects much greater proportions of costs attributed to the services and "other" object classes than is found with the other functions. This is not unusual given that the level of services needed to support such administrative activities as legal services, finance and accounting, purchasing and stores, planning, marketing, and engineering is far greater than the level of services needed to support operations and maintenance functions.

Other expenses, such as casualty and liability costs, taxes, interest payments, depreciation, and leases and rentals, are also attributed to administrative activities. Thus, 27.4 percent of general administration expense is accounted for by services and other items. These object classes account for very little of operations and maintenance expense.

Negative amounts appear in the "other" object classes for the maintenance functions due to expense transfers created by the adjustment and reclassification of previously recorded expenses to other functions. Also, expense transfers resulting when non-operating costs temporarily credited to functions were ultimately capitalized, are also incorporated into the other object class for purposes of this publication. The vehicle and non-vehicle maintenance functions are more capital-intensive and thus more likely to experience capitalization of non-operating costs resulting in expense transfers.

Operating Expense by Mode and Function

Operating expenses by function and mode are displayed in **Exhibit 3-11**. The object class "purchased transportation" is not distributed by function and therefore is excluded from the allocated expenses and reported only as a lump sum in the column total. The only modes unaffected from not having a purchased transportation component in the service supplied are Heavy Rail and Light Rail. Bus and Demand Response are the only individual modes expending more than 50 percent of the total expenses with vehicle operations. The main reason for this is the high unit maintenance cost (vehicle and non-vehicle maintenance) of rail modes when contrasted with Bus and Demand Response. While the share of maintenance for Bus and Demand Response is 26.3 and 15.3 percent, respectively, the share for Heavy Rail, Commuter Rail, and Light Rail is 42.5, 42.7, and 43.9 percent respectively. The share of vehicle operations for Bus is 57 percent and for Demand Response is 67.5 percent. Demand Response is the mode with the highest percentage of expenses for general administration at 17.2 percent.

Exhibit 3-11

Operating Expense by Mode and Function
(Millions)
1995

Mode	Vehicle Operation	Vehicle Maintenance	Non-Vehicle Maintenance	Generai Administration	Total
Bus	$4,889.8	$1,873.6	$386.5	$1,430.4	$8,580.2
Heavy Rail	1,532.4	578.9	918.0	493.7	$3,522.9
Commuter Rail	827.0	482.3	376.4	326.9	$2,012.7
Light Rail	153.9	83.5	81.1	56.7	$375.2
Demand Response	173.3	34.4	4.8	44.2	$256.7
Other	218.4	57.9	32.1	49.9	$358.2
Total Directly Operated	$7,794.8	$3,110.5	$1,798.9	$2,401.8	$15,106.0
Purchased Transportation					$1,075.5
Grand Total					$16,181.6

Service Supplied and Consumed

Introduction

This chapter discusses general trends in service supplied and consumed, as well as measures of service effectiveness and efficiency based on specific performance indicators. Service supplied in the National Transit Database (NTD) includes variables such as vehicle revenue mile and hour, total vehicle miles and hours (revenue miles and hours plus deadhead mileage and time) and vehicles operated in maximum service.

Service consumed is measured by unlinked passenger trips and passenger miles. While service supplied is deterministic and controlled by transit agencies, variables of service consumed are non-deterministic and are determined by transit agencies through sampling. The Federal Transit Administration (FTA) requires that any sampling procedure meet a confidence level of 95 percent and a precision of 10 percent to be accepted for reporting to the NTD.

The most common measures of cost efficiency (the link between inputs, such as labor, capital, and fuel, and outputs, such as vehicle revenue miles and hours) are the ratios between operating expense and vehicle revenue mile or operating expense and vehicle revenue hour. The *National Transit Summaries and Trends (NTST)* presents measures of efficiency using the operating expenses per vehicle revenue mile ratio. Other measures of efficiency can also be easily obtained from the exhibits related to service supplied and operating expenses.

Cost effectiveness (the link between inputs, such as labor, capital, and fuel, and service consumption, such as unlinked passenger trips, passenger miles, operating revenue, and safety) is analyzed through evaluation of the operating expense per unlinked passenger trips and operating expenses per passenger mile ratios.

Service effectiveness (the link between service outputs, such as vehicle revenue miles and hours and service consumption, such as unlinked passenger trips and passenger miles) is presented in this chapter by the ratio between unlinked passenger trips and vehicle revenue miles.

Chapter Organization

Chapter 4 begins with discussions of service supplied and consumed by mode and type of service from 1991 through 1995. Performance measures are then presented to measure the effectiveness and efficiency of service supplied and consumed. Finally, indicators of service supplied and consumed as well as performance measures are provided based on urbanized area (UZA) size.

Vehicle Revenue Miles by Mode

Vehicle revenue miles by mode for the 1991-1995 time frame are displayed in **Exhibit 4-1**. Demand Response and Light Rail are the modes with the largest increases in service supplied for the 1991-1995 time frame. Annual vehicle revenue miles for Demand Response rose 60 percent between 1991 and 1995. Light Rail service increased 27.4 percent during the same time frame. Commuter Rail, Heavy Rail, and Bus experienced less substantial growth with 10 percent, 2.7 percent, and 2.5 percent respectively. Demand Response's growth in revenue miles is explained in part by the fact that many transit agencies started providing service during the 1991-1995 time frame as a requirement of the Americans with Disabilities Act. Light Rail is the mode with the second largest increase in revenue miles and this resulted from new start ups in the last 5 years.

Exhibit 4-1

Vehicle Revenue Miles by Mode
(Millions)
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	1,552.4	1,555.9	1,578.3	1,585.8	1,590.8
Heavy Rail	508.3	509.7	505.2	516.0	521.8
Commuter Rail	197.9	199.9	203.4	209.5	217.8
Light Rail	26.6	27.8	26.9	33.3	33.9
Demand Response	185.8	208.5	243.4	272.8	297.3
Other	27.8	32.2	35.9	62.1	70.8
Total	2,498.8	2,534.0	2,593.1	2,679.5	2,732.4

Vehicle Revenue Hours by Mode

The change in vehicle revenue hours over the 1991-1995 time frame is given in **Exhibit 4-2**. Growing steadily each year, Demand Response had the largest increase at 53 percent. Light Rail and Bus also increased by 9.5 percent and 2.1 percent respectively. Commuter Rail and Heavy Rail increased by 10 percent, and 16.1 percent respectively, compared with 1991. Heavy Rail hours have increased steadily since 1991.

Exhibit 4-2

Vehicle Revenue Hours by Mode
(Millions)
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	120.9	122.0	122.7	123.0	123.4
Heavy Rail	21.7	23.3	24.7	25.0	25.2
Commuter Rail	5.9	5.8	6.0	6.2	6.5
Light Rail	2.1	2.1	1.9	2.3	2.3
Demand Response	13.4	14.9	16.9	19.6	20.5
Other	2.5	2.6	2.7	4.2	5.3
Total	166.5	170.7	174.9	180.3	183.3

Vehicles Operated in Maximum Service by Mode

Variations in the number of vehicles operated in maximum service over the 1991-1995 time frame are presented in **Exhibit 4-3**. Similar to past patterns shown for vehicle revenue miles and hours in previous exhibits, Demand Response is the mode with the largest increase in the number of vehicles operated in maximum service between 1991 and 1995. Demand Response increased by 52 percent during this time frame. Other modes, such as Bus and Heavy Rail, displayed modest increases. Demand Response is the only mode with an increase greater than the overall increase of 12.3 percent in the 1991-1995 time frame. The large increase in the number of vehicles operated in maximum service for Demand Response is partially explained by its low capacity nature and growing demand for this mode. Light Rail shows a trend of decrease in vehicles operated in maximum service despite the fact that the number of agencies operating this mode increased from 15 in 1991 to 19 in 1995. However, the service distribution supplied among Light Rail operators varies, and many large agencies report over 34 percent of all data for Light Rail. For example, Boston and Philadelphia have experienced decreases in the service supplied for Light Rail. These decreases offset the expansion in the number of new systems during the 1991-1995 time frame.

Exhibit 4-3

Vehicles Operated in Maximum Service by Mode
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	42,959	43,861	44,041	43,723	43,577
Heavy Rail	8,106	8,180	8,187	8,277	7,973
Commuter Rail	3,989	3,949	4,214	4,349	4,413
Light Rail	811	798	773	769	746
Demand Response	8,435	9,274	11,262	12,828	12,825
Other	1,524	1,633	1,830	3,702	4,414
Total	65,824	67,695	70,307	73,648	73,948

Service Supplied: Modal Comparison

Exhibit 4-4 compares modal shares of the service supplied measures examined in this chapter. Evident is the dominance of Bus service, accounting for 58.2, 67.3, and 58.9 percent of vehicle revenue miles, revenue hours, and number of vehicles operated in maximum service, respectively. Bus and Demand Response have a larger share of vehicle revenue hours when compared with vehicle revenue miles. Also, the data indicates that Bus is slower than Demand Response. Bus systems operate on fixed routes with fixed stops and incur dwell time in traffic. Dwell time represents an important component of the traveling time for Bus. Service supplied data for Demand Response reveals the low capacity nature of this mode when contrasted with Bus and rail modes. Demand Response shares 17.3 percent of total vehicles operated in maximum service, but its share of vehicle revenue miles and hours is only 10.9 percent.

Exhibit 4-4

Modal Comparison of Service Supplied
1995

Mode	Percentage of Vehicle Revenue Miles	Percentage of Vehicle Revenue Hours	Percentage of Vehicles in Maximum Service
Bus	58.2%	67.3%	58.9%
Heavy Rail	19.1%	13.8%	10.8%
Commuter Rail	8.0%	3.5%	6.0%
Light Rail	1.2%	1.3%	1.0%
Demand Response	10.9%	11.2%	17.3%
Other	2.6%	2.9%	6.0%
Total	100.0%	100.0%	100.0%

Among rail modes, Heavy Rail and Commuter Rail are fixed guideway modes that usually do not share the right-of-way with other modes or general traffic. Therefore, their shares of vehicle revenue miles are greater than their shares of vehicle revenue hours. Light Rail is the mode with the smallest share of vehicle revenue miles, vehicle revenue hours, and vehicles operated in maximum service. Many Light Rail systems do not operate in exclusive rights-of-way and this affects their average speed.

Service Consumed: Unlinked Passenger Trips by Mode

Changes in unlinked passenger trips over the past 5 years are shown in **Exhibit 4-5**. Overall, ridership decreased 3 percent from 1991 to 1995. Bus ridership declined slightly in 1995 compared with 1994 and is still 5.1 percent less than 1991. Heavy Rail exhibits different behavior. The ridership for this mode decreased in 1995 by 6.2 percent and is 6.1 percent smaller than in 1991. Commuter Rail reversed the trend of decrease observed between 1991 and 1992 and unlinked passenger trips for this mode increased from 1992 to 1995 by 9.5 percent. Light Rail shows a ridership increase of nearly 35 percent between 1991 and 1995. Demand Response ridership increased by 31 percent during the 1991-1995 time frame; however, the rate of increase has slowed between 1993 and 1995. In 1995, unlinked passenger trips for Demand Response were 1.8 percent greater than in 1994.

Unlinked Passenger Trips by Mode
(Millions)
1991-1995

Exhibit 4-5

Mode	1991	1992	1993	1994	1995
Bus	4,826	4,748	4,638	4,629	4,579
Heavy Rail	2,167	2,207	2,046	2,169	2,034
Commuter Rail	324	314	321	339	344
Light Rail	184	187	188	282	249
Demand Response	42	45	52	54	55
Other	192	194	188	228	243
Total	7,735	7,695	7,433	7,702	7,504

Passenger Miles by Mode

Another measure of service consumption, passenger mile, is a variable reported by agencies in the NTD. Passenger miles are available by mode and type of service and are usually determined through sampling.

The dominance of Bus is again evident when examining passenger miles by mode. Bus accounts for 44.8 percent of all passenger miles, followed by 27.8 percent for Heavy Rail and 21.7 percent for Commuter Rail. Light Rail and Demand Response each account for 2.3 percent and 1 percent, respectively, of the total.

As seen in **Exhibit 4-6,** passenger miles increased slightly (1.3 percent) in the 1991-1995 time frame. Bus experienced a small decrease in passenger miles between 1991 and 1995, and accounted for 44.8 percent of all passenger miles in 1995. Light Rail and Demand Response are the modes with the largest increases in passenger miles for the 1991-1995 time frame (30.0 and 44.9 percent respectively) following the trend observed for unlinked passenger trips for these two modes.

Passenger Miles by Mode
(Millions)
1991-1995

Exhibit 4-6

Mode	1991	1992	1993	1994	1995
Bus	18,104	17,494	17,364	17,195	17,024
Heavy Rail	10,488	10,737	10,231	10,668	10,559
Commuter Rail	7,383	7,320	6,912	7,996	8,244
Light Rail	661	700	704	831	859
Demand Response	274	317	389	377	397
Other	563	585	625	815	888
Total	37,473	37,153	36,225	37,882	37,971

Passenger miles increased by 0.2 percent in 1995 from 1994 and only Bus and Heavy Rail experienced decreases in relation to 1994. The mode with the highest increase in 1995 was Demand Response with 5.3 percent compared with 1994.

Service Consumed: Modal Comparison

The distribution of unlinked passenger trips and passenger miles by mode is given in **Exhibit 4-7** as well as the average trip length for each mode. Bus is the mode with the biggest share of service consumed with 61 percent of all unlinked passenger trips and 44.8 percent of all passenger miles in 1995. Heavy Rail displays a similar share of unlinked passenger trips and passenger miles and consumes the second largest share of service. Commuter Rail's share of passenger miles is much higher than its share of unlinked passenger trips; this results from the long trip length of this mode. Light Rail and Demand Response account for a small share of service consumed, both in terms of ridership and passenger miles.

Exhibit 4-7

Distribution of Unlinked Passenger Trips and Passenger Miles With Average Trip Length by Mode 1995

Mode	Percentage of Total Unlinked Passenger Trips	Percentage of Total Passenger Miles	Average Trip Length in Miles
Bus	61.0%	44.8%	3.7
Heavy Rail	27.1%	27.8%	5.2
Commuter Rail	4.6%	21.7%	24.0
Light Rail	3.3%	2.3%	3.4
Demand Response	0.7%	1.0%	7.2
Other	3.2%	2.3%	3.6
Total	100.0%	100.0%	
Weighted Average			5.1

Performance Indicators

Certain performance indicators are used to assess the effectiveness and efficiency of transit service delivery. Operating expense per vehicle revenue mile is one measure of service efficiency, while operating expense per unlinked passenger trip and operating expense per passenger mile offer measures of cost effectiveness. Service effectiveness is analyzed by examining the ratio between unlinked passenger trips and vehicle revenue miles.

Service Efficiency: Operating Expense per Vehicle Revenue Mile by Mode

Service efficiency as measured by operating expense per vehicle revenue mile is displayed in **Exhibit 4-8**. Demand Response has the smallest cost per mile at $2.32 per vehicle revenue mile, followed by Bus at $5.64 per vehicle revenue mile. The rail modes displayed higher operating expense per revenue mile than Bus and Demand Response. The cost per mile increased for all modes except for Heavy Rail during the 1991-1995 time frame. Heavy Rail's decrease was 10.7 percent. Among the modes that experienced increases, Bus had a 10.4 percent increase followed by Demand Response with 7.4 percent. Commuter Rail and Light Rail show slight increases in operating expense per vehicle revenue mile with increases of 2.6 and 1.7 percent respectively between 1991 and 1995. Compared with 1994, all modes experienced decreases in cost per mile except Bus.

Exhibit 4-8

Operating Expense per Vehicle Revenue Mile by Mode
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	$5.11	$5.31	$5.39	$5.59	$5.64
Heavy Rail	7.56	6.97	7.26	7.34	6.75
Commuter Rail	9.87	10.05	10.22	10.63	10.13
Light Rail	10.89	11.05	11.66	12.38	11.07
Demand Response	2.16	2.20	2.22	2.32	2.32

Cost Effectiveness: Operating Expense per Unlinked Passenger Trip by Mode

Each mode's cost effectiveness measured by operating expenses per unlinked passenger trip is displayed in **Exhibit 4-9**. Light Rail, Heavy Rail, and Bus are the most cost effective modes with costs per trip ranging from $1.51 to $1.96. Commuter Rail and Demand Response, however, are much less effective. For not being a mass transit mode, Demand Response has a higher cost per unlinked passenger trip than any other mode. Commuter Rail has poor cost effectiveness as measured by operating expense per unlinked passenger trip but has much better effectiveness if the measure is operating expense per passenger mile.

Exhibit 4-9

Operating Expense per Unlinked Passenger Trip by Mode
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	$1.65	$1.74	$1.84	$1.91	$1.96
Heavy Rail	1.77	1.61	1.79	1.75	1.73
Commuter Rail	6.03	6.40	6.48	6.57	6.42
Light Rail	1.57	1.64	1.68	1.46	1.51
Demand Response	9.57	10.18	10.38	11.73	12.57

Demand Response is the mode with the highest increase in operating expense per passenger trip for the 1991 - 1995 time frame with an increase of 31.3 percent. Demand Response is the mode where ridership growth always adversely

affects its cost effectiveness. Bus increased by 18.8 percent during the 1991-1995 time frame while Commuter Rail increased by 6.5 percent. Heavy Rail and Light Rail decreased in operating expense per unlinked passenger trip for the 1991-1995 time frame.

Operating Expense per Passenger Mile by Mode

Another assessment of cost effectiveness is provided through a comparison of operating expense per passenger mile by mode in **Exhibit 4-10**. Commuter Rail and Heavy Rail are the most cost effective modes when cost per passenger mile is examined. This is due to their greater vehicle capacity, higher ridership, and longer trips taken on these modes. Conversely, Demand Response has the highest cost per passenger mile due to its low vehicle capacity.

Exhibit 4-10

Operating Expense per Passenger Mile by Mode
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	$0.44	$0.47	$0.49	$0.52	$0.53
Heavy Rail	0.37	0.33	0.36	0.35	0.33
Commuter Rail	0.26	0.27	0.30	0.28	0.27
Light Rail	0.44	0.44	0.45	0.50	0.44
Demand Response	1.47	1.45	1.39	1.68	1.74

The change in operating cost per passenger mile by mode from 1991 to 1995 reveals that all modes experienced increases in cost per mile during this period except Heavy Rail and Light Rail. The largest increases occurred in Bus with 20.4 percent and Demand Response with 18.4 percent. Heavy Rail decreased by 10.8 percent between 1991 and 1995.

Service Effectiveness: Unlinked Passenger Trips Per Vehicle Revenue Mile by Mode

Each mode's service effectiveness is measured by comparing service used to service supplied. In this chapter, it is measured by the ratio of unlinked passenger trips to vehicle revenue miles. As **Exhibit 4-11** shows, Light Rail is the mode with the best service effectiveness followed by Heavy Rail. These two modes have higher service effectiveness than other modes; however, the nature of the service for each mode must be considered. Heavy and Light Rail systems are designed to operate within corridors with high population densities, and are served by feeder Bus services and park-and-ride facilities to increase capture areas of potential riders. These two modes carry more ridership per vehicle revenue mile based on their design as higher capacity modes. Commuter Rail usually links areas of attraction separated by long distances and has its ridership concentrated during peak hours, which is reflected in its high peak-to-base ratio. These factors combined result in a much smaller ratio of unlinked passenger trips per revenue mile for Commuter Rail compared with Light Rail and Heavy Rail.

Bus reflects a more moderate utilization because Bus services are provided on routes through highly dense areas of transit-dependent markets and operate during peak hours of ridership. In addition, Bus services are also provided during off-peak hours in less densely populated areas. Thus, in the aggregate, the combination of high and low effective routes results in the moderate service effectiveness of Bus, and a large variance in the distribution of its service effectiveness across transit agencies. Demand Response is designed to have much lower capacity and a greater flexibility and convenience for the user. Thus, Demand Response displays lower ridership along with significant miles of operation compared to other modes.

Demand Response has a consistent trend of ridership increases from 1991 to 1995. Revenue miles also show an increasing trend but at a much higher rate than ridership due to the nature of the service and the low capacity of Demand Response services. As a result, Demand Response has decreased service effectiveness. For Demand Response, which has poor cost and service effectiveness compared with other high capacity modes, an increase in the demand for service would require more financial assistance from the public sector or fare increases to cover an increasing operating deficit.

Exhibit 4-11

Unlinked Passenger Trips per Vehicle Revenue Mile by Mode 1991-1995

Mode	1991	1992	1993	1994	1995
Bus	3.11	3.05	2.94	2.92	2.88
Heavy Rail	4.26	4.33	4.05	4.20	3.90
Commuter Rail	1.64	1.57	1.58	1.62	1.58
Light Rail	6.90	6.74	6.96	8.48	7.35
Demand Response	0.23	0.22	0.21	0.20	0.18

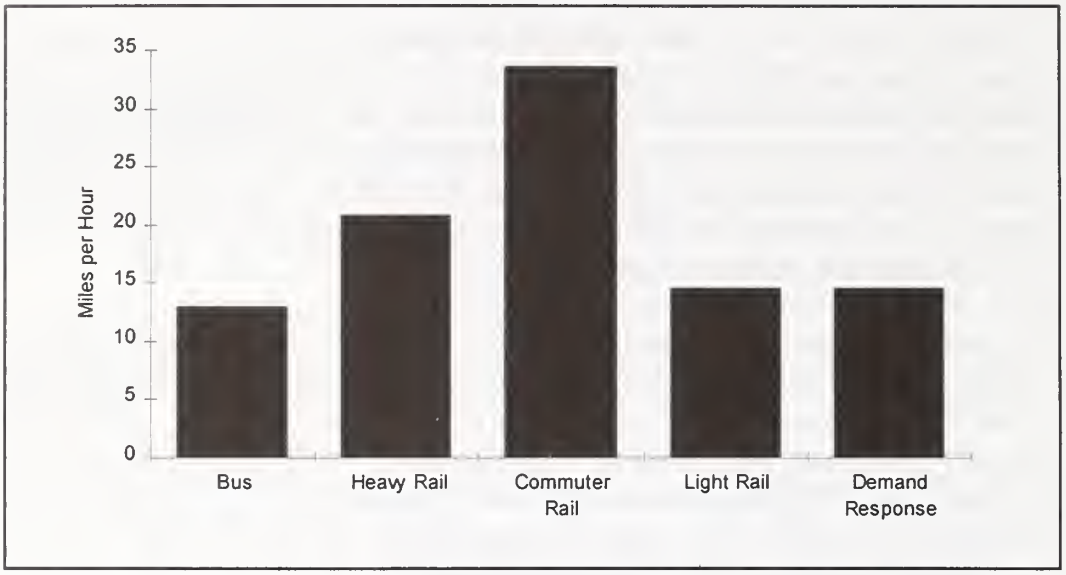
The change in unlinked passenger trips per vehicle revenue mile by mode from 1991 to 1995 shows that all modes experienced decreases during this period except Light Rail. Demand Response shows the largest decrease with 21.7 percent. Bus, Heavy Rail, and Commuter Rail displayed decreases of 7.4, 8.4, and 3.6 percent, respectively, for the 1991-1995 time frame. Light Rail shows an increase in service effectiveness of 6.5 percent for that period.

Average Operating Speed

Average operating speed varies greatly among the modes. As **Exhibit 4-12** shows, Bus, Light Rail, and Demand Response services operate at much slower speeds than Heavy Rail or Commuter Rail. Bus service operates in mixed traffic with frequent stops for boarding and alighting. Many Light Rail systems must also contend with mixed traffic while operating at-grade. The station/stop spacing of Light Rail also requires more frequent stopping for passenger boarding and alighting compared with other rail modes. Demand Response service also operates in mixed traffic and deals with significantly longer

Average Operating Speed by Mode
1995

Exhibit 4-12



boarding and alighting times for physically challenged patrons. Heavy Rail and Commuter Rail operate along exclusive fixed guideways, with Heavy Rail stopping more frequently due to a shorter station spacing than Commuter Rail.

Service Supplied and Consumed by Mode for Purchased Transportation 1994-1995

Exhibit 4-13 shows service supplied and service consumed data for purchased transportation for the years 1994 and 1995. Purchased transportation data reported from a directly operated perspective is included in this exhibit; therefore, comparisons between this exhibit and the purchased transportation data included in the National Transit Profile (Chapter 1) should be avoided. The operating expense data included in this exhibit is the expense incurred by public agencies purchasing the services. In the aggregate, miles and hours of service for purchased transportation increased slightly in 1995 while the number of vehicles operated in maximum service had a small decline. Conversely, ridership decreased by a higher percentage (14.1 percentage decrease in unlinked passenger trips and 17.5 percent in passenger miles). At modal level, Bus showed decline in both service supplied and service consumed in 1995. Purchased Bus service has a commuter orientation, as the percentage of unlinked passenger trips to the national total (6.1 percent) is smaller than the percentage of passenger miles (9.6 percent). Demand Response has a different trend with miles and hours of service increasing 6.7 and 3.4 percent, respectively. Ridership decreased by 1 percent while passenger miles increased 1.9 percent. Commuter Rail showed sharp declines in service supplied and consumed in 1995. The reason for these decreases is related to a reporting change implemented by a large Commuter Rail operator.

Exhibit 4-13

Service Supplied and Consumed for Purchased Transportation 1995

	Mode	Operating Expense (millions)	Vehicle Revenue Miles (millions)	Vehicle Revenue Hours (millions)	Vehicles operated in maximum service	Unlinked Passenger Trips (millions)	Passenger Miles (millions)
1995	Bus	$816.5	199.1	12.8	5,765	328.5	2,391.1
	Commuter Rail	194.0	19.1	0.5	522	21.9	662.8
	Demand Response	466.4	218.9	15.2	9,976	39.5	273.5
	Other	56.8	37.0	2.7	2,587	65.5	317.3
	Total	$1,533.7	474.1	31.2	18,850	455.5	3,644.6
	% of National Total	9.5%	17.4%	17.0%	25.5%	6.1%	9.6%
1994	Bus	$810.3	204.5	13.3	5,821	384.5	2,512.4
	Commuter Rail	293.6	35.0	0.9	1,001	56.3	1,387.9
	Demand Response	439.8	205.1	14.7	10,295	39.9	268.3
	Other	48.2	28.4	1.6	1,960	49.7	248.1
	Total	$1,591.9	472.9	30.5	19,077	530.3	4,416.6
	% of National Total	9.8%	17.6%	16.9%	25.9%	6.9%	11.7%

This agency previously reported part of its Commuter Rail service as purchased transportation. Beginning in 1995, the agency reports it as directly operated. This change was consistent with the concept of purchased transportation in the National Transit Database.

Vehicle Revenue Miles by UZA Size and Mode

Vehicle revenue miles by UZA size and mode can be seen in **Exhibit 4-14**. It displays the significant share of vehicle revenue miles provided within UZAs with populations greater than 1 million. In total, 79.4 percent of all vehicle revenue miles were operated in these larger areas, followed by 14.0 and 6.6 percent in medium and small UZAs respectively. The amount and mode of service varies by UZA size. Most obvious are the rail services, which operate almost exclusively in large areas. The three rail modes combined account for 36.5 percent of all revenue miles in large UZAs. Bus accounts for more than 55 percent of vehicle revenue miles in these areas, followed by Demand Response with 8.2 percent. Service within the mid-size urbanized areas is also dominated by Bus with 78.6 percent. Demand Response service, however, accounts for a larger portion of service with a 19.3 percent share. The Demand Response share is largest in small UZAs, where it provides 20.8 percent of all service operated.

Vehicle Revenue Miles by UZA Size and Mode
(Millions)
1995

Exhibit 4-14

UZA Size	Mode						Total
	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response	Other	
Over 1 Million	1,162.1	521.8	217.4	32.9	174.2	60.3	2,168.7
200,000 to 1 Million	301.4	-	0.4	1.0	73.9	7.0	383.6
Under 200,000	127.3	-	-	0.0	49.2	3.5	180.0
Total	1,590.8	521.8	217.8	33.9	297.3	70.8	2,732.4

Vehicles Operated in Maximum Service by UZA Size and Mode

The number of vehicles operated in maximum service by UZA size and mode is displayed in **Exhibit 4-15**. Patterns in vehicle revenue miles are also provided with the number of vehicles. First, Heavy Rail, Commuter Rail, and Light Rail are operated almost exclusively in the largest UZAs. Combined, these modes account for 23.2 percent of the total vehicles operated during maximum service. Second, Bus is the dominant mode in all UZAs, regardless of size. Finally, the share of Demand Response vehicles has an inverse relationship to urbanized area size. The greatest share of 40.6 percent occurs in the small UZAs, then decreases to 25 percent in the medium areas and further drops to 13.2 percent in the large areas.

Vehicles Operated in Maximum Service by UZA Size and Mode
1995

Exhibit 4-15

UZA Size	Mode						Total
	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response	Other	
Over 1 Million	32,069	7,973	4,401	714	7,436	3,700	56,293
200,000 to 1 Million	8,128	-	12	28	2,857	390	11,415
Under 200,000	3,380	-	-	4	2,532	324	6,240
Total	43,577	7,973	4,413	746	12,825	4,414	73,948

Unlinked Passenger Trips by UZA Size and Mode

The unlinked passenger trips by UZA size and mode can be seen in **Exhibit 4-16**. It displays the change in transit ridership from 1991 to 1995 by UZA size and mode. There were ridership decreases in all areas. For the 1991-1995 time frame, the ridership for large UZAs decreased by 3.4 percent. This exhibit shows that transit ridership is concentrated in the large UZAs. In total, nearly 88 percent of all transit trips occurred in these areas. The mid-size areas followed with nearly 9 percent, and the small areas accounted for only 3 percent of the total transit ridership during this period.

Exhibit 4-16

Unlinked Passenger Trips by UZA Size and Mode
(Millions)
1991-1995

UZA Size	Year	Mode						Total
		Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response	Other	
Over 1 Million	1991	3,951	2,167	324	175	23	187	6,827
	1992	3,859	2,207	313	179	25	188	6,771
	1993	3,757	2,046	320	179	28	182	6,512
	1994	3,748	2,169	339	273	29	220	6,779
	1995	3,714	2,034	343	241	30	235	6,596
200,000 to 1 Million	1991	657	-	0	8	10	4	679
	1992	666	-	0	9	11	4	690
	1993	661	-	0	8	12	5	686
	1994	658	-	0	9	13	5	686
	1995	651	-	0	8	13	6	679
Under 200,000	1991	217	-	-	0	9	2	228
	1992	223	-	-	0	10	2	235
	1993	221	-	-	0	12	2	235
	1994	223	-	-	0	12	2	237
	1995	214	-	-	0	12	3	229
Total	1991	4,825	2,167	324	183	42	193	7,734
	1992	4,748	2,207	314	187	45	194	7,695
	1993	4,638	2,046	321	188	52	188	7,433
	1994	4,629	2,169	339	282	54	228	7,702
	1995	4,579	2,034	344	249	55	243	7,504

Comparing 1995 to 1994, Demand Response experienced a small ridership growth in large UZAs by 3.4 percent. Bus had decreased ridership in all areas, and the largest decrease occurred in small areas at 4 percent. Light Rail also experienced ridership decreases in all areas with an 11.7 percent decrease in large UZAs. Commuter Rail ridership increased 1.2 percent in large UZAs. Heavy Rail, the only mode to operate solely in the large UZAs, posted a ridership loss of 6.2 percent in 1995.

Passenger Miles by UZA Size and Mode

The change in passenger miles by UZA size and mode between 1991 and 1995 is provided in **Exhibit 4-17**. Overall, there was a 12.2 percent increase in passenger miles in small UZAs between 1991 and 1995. Passenger miles in mid-size and large UZAs remained stable between 1991 and 1995.

Passenger Miles by UZA Size and Mode
(Millions)
1991-1995

Exhibit 4-17

UZA Size	Year	Mode						Total
		Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response	Other	
Over 1 Million	1991	14,771	10,488	7,379	642	147	512	33,939
	1992	14,127	10,737	7,315	681	162	529	33,551
	1993	14,014	10,231	6,906	684	209	546	32,590
	1994	13,760	10,668	7,990	811	203	717	34,150
	1995	13,679	10,559	8,238	841	217	794	34,328
200,000 to 1 Million	1991	2,553	-	0	20	73	38	2,684
	1992	2,552	-	5	19	91	46	2,713
	1993	2,540	-	6	19	104	52	2,721
	1994	2,593	-	6	19	96	65	2,779
	1995	2,518	-	6	18	99	53	2,694
Under 200,000	1991	780	-	-	0	53	13	846
	1992	815	-	-	0	63	10	888
	1993	810	-	-	0	77	27	914
	1994	843	-	-	0	77	33	953
	1995	827	-	-	0	81	41	949
Total	1991	18,104	10,488	7,384	662	273	563	37,474
	1992	17,494	10,737	7,320	700	317	585	37,153
	1993	17,364	10,231	6,912	704	389	625	36,225
	1994	17,196	10,668	7,996	830	376	815	37,881
	1995	17,024	10,559	8,244	859	397	888	37,971

Passenger miles, like transit ridership, are concentrated in large UZAs. Given the interaction between these two measures, it is not surprising to find that historically, approximately 90 percent of all passenger miles occurred in these larger UZAs. The remaining 10 percent was split between the mid-size UZAs with 7 percent and the small UZAs with 3 percent. Examination of the modal data indicates that Demand Response is the only mode to show growth among all UZAs over the 5-year period with 53 percent in small areas, 35.6 percent in mid-size UZAs, and 47.6 percent in large UZAs between 1991 and 1995. The other area of significant growth occurred in Light Rail passenger miles, which posted a 31 percent increase in large UZAs. Heavy Rail experienced an increase in passenger miles for the 1991-1995 time frame with .7 percent but had a decrease of 1 percent from 1994 to 1995. Bus experienced growth in passenger miles for small UZAs with 6 percent, and a 7.4 percent decrease in large UZAs. Bus displayed a consistent trend of decline in ridership and passenger miles in large UZAs over the 1991-1995 time frame. Commuter Rail displayed an increase in passenger miles between 1991 and 1995 with 11.6 percent and an increase of 3.1 percent from 1994 to 1995.

Operating Expense per Vehicle Revenue Mile by UZA Size and Mode

Operating expense per vehicle revenue mile by UZA size for each mode is displayed in **Exhibit 4-18**. The cost per mile for Bus and Demand Response service has a direct relationship with UZA size: cost increases with population size. The cost per Bus vehicle revenue mile in large UZAs is 88 percent greater than in small UZAs and 53.8 percent greater than in mid-size UZAs. The differences are not as great for Demand Response, in which the cost per mile in large UZAs is 18.3 and 13 percent higher than in small and mid-size UZAs respectively. The opposite is true for Light Rail and Commuter Rail where the cost per mile in large UZAs is lower than in mid-size UZAs: 27.5 percent lower for Commuter Rail and 25.1 percent lower for Light Rail.

Exhibit 4-18

Operating Expense per Vehicle Revenue Mile by UZA Size and Mode
1995

UZA Size	Mode				
	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response
Over 1 Million	$6.29	$6.75	$10.12	$10.95	$2.45
200,000 to 1 Million	4.09	-	13.97	14.63	2.17
Under 200,000	3.35	-	-	12.75	2.07
Weighted Average	$5.64	$6.75	$10.13	$11.07	$2.32

Operating Expense per Unlinked Passenger Trip by UZA Size and Mode

The cost effectiveness of each mode by UZA size as measured by the cost per unlinked passenger trip is shown in **Exhibit 4-19**. The cost effectiveness of Bus service does not vary greatly by UZA size. Demand Response is more cost effective in small UZAs than in mid-size and large UZAs, contrasting against high capacity modes such as Commuter Rail and Light Rail that show a trend of better cost effectiveness in large UZAs.

Exhibit 4-19

Operating Expense per Unlinked Passenger Trip by UZA Size and Mode
1995

UZA Size	Mode				
	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response
Over 1 Million	1.97	$1.73	6.41	1.49	14.36
200,000 to 1 Million	1.89	-	$19.98	1.84	12.00
Under 200,000	$1.99	-	-	$2.16	$8.67
Weighted Average	$1.96	$1.73	$6.42	$1.51	$12.57

Operating Expense per Passenger Mile by UZA Size and Mode

Operating expense per passenger mile by UZA area size and mode is displayed in **Exhibit 4-20**. This measure of cost effectiveness displays some of the same trends as those found in the cost per trip ratios. Specifically, the cost per passenger mile for Bus is lower in mid-size UZAs with 7.5 percent and slightly higher in large UZAs at 2 percent, compared with the small UZAs. In addition, the cost of Demand Response service increases with urbanized area size: 29.6 percent higher for mid-size UZAs and 57.6 percent higher for large UZAs when compared with the cost in small areas. Light Rail and Commuter Rail show the opposite pattern; their cost per mile decreases as the UZA size increases. Light Rail costs in large UZAs are nearly 49 percent smaller than in mid-size UZAs. A decrease of 72.4 percent occurs for Commuter Rail when comparing the cost per passenger mile in mid-size UZAs with the cost in large areas.

Exhibit 4-20

Operating Expense per Passenger Mile by UZA Size and Mode
1995

UZA Size	Mode				
	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response
Over 1 Million	$0.53	$0.33	$0.27	$0.43	$1.97
200,000 to 1 Million	0.49	-	0.98	0.85	1.62
Under 200,000	0.52	-	-	0.80	1.25
Weighted Average	$0.53	$0.33	$0.27	$0.44	$1.74

Average Operating Speed by UZA Size and Mode

Average operating speed of each mode by UZA size is presented in **Exhibit 4-21** Bus service in large UZAs operates 9 and 11 percent slower than in mid-size and small UZAs respectively. Demand Response and Light Rail, however, show a different pattern. The average operating speed of Demand Response service in mid-size UZAs is 5.4 percent higher than for small UZAs. For large UZAs, the average operating speed for Demand Response is 1.5 percent higher than for small UZAs. The operating speed of Light Rail, however, increases dramatically with UZA size.

Exhibit 4-21

Average Operating Speed by UZA Size and Mode
1995

UZA Size	Mode				
	Bus	Heavy Rail	Commuter Rail	Light Rail	Demand Response
Over 1 Million	12.56	20.70	33.58	14.66	14.37
200,000 to 1 Million	13.81	-	40.45	10.82	14.93
Under 200,000	14.11	-	-	4.72	14.16
Weighted Average	12.90	20.70	33.59	14.49	14.47

Safety

Introduction

This chapter discusses an important measure of service quality: operations safety. Data regarding safety related incidents are presented for each of the five major modes.

Chapter Organization

The chapter discusses safety of transit operations as measured by collision and non-collision incidents, and by comparisons among injuries, fatalities, and property damage. Data is available only for directly operated service; therefore, absolute figures for injuries, fatalities, and property damage are understated. This is especially true for modes such as Demand Response which have a substantial amounts of data reported as purchased transportation in the National Transit Database. The figures for Heavy Rail and Light Rail are not understated, because they are reported as directly operated.

Several exhibits in this chapter present ratios between variables related to safety, such as incidents, injuries, and fatalities and those related to service consumption, such as unlinked passenger trips. These exhibits more accurately reflect safety trends spanning the last 5 years because service consumption data are reported for both directly operated service and purchased transportation. The proportion of directly operated service to the total universe of reporters is large enough to guarantee a satisfactory level of confidence, and tolerance for the ratios between variables for safety and those for service consumption.

General Notes

Collision incidents are those that involve one or more transit agency vehicles colliding with any other vehicle, obstacle, or person. Non-collision incidents involve the following:

- Derailments
- Buses or other transit vehicles leaving the roadway
- Personal injuries incurred while inside the transit vehicle resulting from sudden braking or unexpected swerving
- Falls or other mishaps experienced while boarding or alighting
- Injuries sustained at stations or bus stops

All incidents resulting in an injury or fatality and all incidents with transit property damage in excess of $1,000 are reported, as well as incidents involving fire.

Total Reported Incidents by Mode

Exhibit 5-1 provides total reportable incidents by mode from 1991 to 1995. Variations in the total number of incidents follow the ridership variations for the 1991-1995 time frame. When ridership increases, the number of incidents increase. The total number of incidents decreased in 1995 by nearly 11 percent, reflecting a decrease in ridership of 2.6 percent compared to 1994. All modes experienced decreases in the number of incidents except Demand Response. However, the data for Demand Response is understated due to the high percentage of purchased transportation for this mode. The mode with the largest decrease in the number of incidents was Bus with a 12 percent decrease. Among rail modes, Commuter Rail had the largest decrease with 10 percent, followed by Heavy Rail and Light Rail with 9.7 and 8.6 percent respectively.

Exhibit 5-1

Total Reported Incidents by Mode
Directly Operated Service
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	66,036	52,381	45,545	47,924	42,143
Heavy Rail	14,917	15,512	15,082	15,862	14,316
Commuter Rail	3,236	3,235	2,111	3,115	2,847
Light Rail	1,700	1,520	1,182	1,413	1,271
Demand Response	1,457	1,147	973	1,051	1,167
Total	87,346	73,795	64,893	69,365	61,744

Total Fatalities by Mode

Fatalities are also well correlated to ridership, depicting a trend similar to incidents in **Exhibit 5-2**. The number of fatalities decreased from 1994 to 1995 by 14.2 percent. At the modal level, Bus and Commuter Rail reported significant decreases in the number of fatalities for the 1991-1995 time frame. For these modes, fatalities decreased by 23.8 percent and 17.8 percent, respectively. As expected, the number of fatalities by mode for any given year tends to be greater for modes with the highest levels of ridership, such as Bus and Heavy Rail.

Exhibit 5-2

Total Fatalities by Mode
Directly Operated Service
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	87	99	83	105	80
Heavy Rail	100	91	83	85	79
Commuter Rail	93	80	86	112	92
Light Rail	13	7	15	13	15
Demand Response	3	0	2	2	6
Total	296	277	269	317	272

Total Injuries by Mode

Total injuries by mode are presented in **Exhibit 5-3**. These figures include injuries experienced by passengers in both collision and non-collision incidents and also injuries experienced by non-passengers, such as auto passengers involved in an auto and Bus incident.

Exhibit 5-3

Total Injuries by Mode
Directly Operated Service
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	38,164	39,552	38,300	41,663	40,474
Heavy Rail	9,282	10,446	10,532	11,666	11,238
Commuter Rail	2,308	2,546	1,560	2,374	2,374
Light Rail	1,251	1,269	982	1,181	1,303
Demand Response	620	705	649	721	932
Total	51,625	54,518	52,023	57,605	56,321

Total Property Damage by Mode

Total property damage for each major mode is presented in **Exhibit 5-4**. Bus experienced a 20 percent increase compared to 1994. Property damage increased in 1995 for every mode except Commuter Rail which decreased by 10 percent. Heavy Rail increased approximately 179 percent while Light Rail had the largest increase at nearly 113 percent. Data for Bus and Demand Response are understated due to the substantial amount of purchased transportation service reported for these two modes.

Exhibit 5-4

Total Property Damage by Mode
Directly Operated Service
(Thousands)
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	$26,256.95	$24,793.07	$30,463.56	$29,949.02	$35,922.31
Heavy Rail	6,525.83	7,333.79	9,003.76	1,597.03	2,853.59
Commuter Rail	1,295.62	2,986.77	3,911.64	5,140.60	4,628.51
Light Rail	1,008.11	1,184.83	801.08	784.72	1,669.27
Demand Response	868.48	1,080.70	549.80	778.65	985.02
Total	$35,954.99	$37,379.15	$44,729.84	$38,250.02	$46,058.69

Total Incidents per Vehicle Mile by Mode

Incidents per vehicle miles are presented in **Exhibit 5-5**. Light Rail is the mode with the highest rate of incidents per vehicle mile followed by Heavy Rail and Bus.

Exhibit 5-5

Total Incidents per Vehicle Mile by Mode
Directly Operated Service
1995

Mode	Incidents	Vehicle Miles (Millions)	Incidents Per Million Vehicle Miles
Bus	42,143	1,687.8	25.0
Heavy Rail	14,316	537.2	26.6
Commuter Rail	2,847	217.1	13.1
Light Rail	1,271	34.5	36.9
Demand Response	1,167	108.0	10.8
Total	61,744	2,585	
Weighted Average			23.9

Injuries per Unlinked Passenger Trips

The relative safety of rail modes as measured by the ratio between injuries and unlinked passenger trips compared with Bus and Demand Response is presented in **Exhibit 5-6**. Demand Response's rate of 17 injuries per 100 million unlinked passenger trips is approximately 3.3 times greater than Light Rail's rate of 5.2 injuries per 100 million unlinked passenger trips.

Exhibit 5-6

Total Injuries per 100 Million Unlinked Passenger Trips
Directly Operated Service
1995

Mode	Injuries	Unlinked Passenger Trips (Millions)	Injuries Per 100 Million Unlinked Passenger Trips
Bus	40,474	4,579.1	8.8
Heavy Rail	11,238	2,033.5	5.5
Commuter Rail	2,374	343.5	6.9
Light Rail	1,303	249.3	5.2
Demand Response	932	54.9	17.0
Total	56,321	7,260.3	
Weighted Average			7.8

Fatalities per Unlinked Passenger Trips

Exhibit 5-7 displays the high incidence of fatalities per 100 million unlinked passenger trips for Commuter Rail with a rate of 26.8 fatalities. Demand Response shows a rate of 10.9 fatalities per 100 million unlinked passenger trips. The rates for Heavy Rail and Light Rail are 3.9 and 6.0 respectively. Bus shows the lowest rate with only 1.7 fatalities per 100 million unlinked passenger trips.

Total Fatalities perUnlinked Passenger Trips
Directly Operated Service
1995

Exhibit 5-7

Mode	Fatalities	Unlinked Passenger Trips (Millions)	Fatalities Per 100 Million Unlinked Passenger Trips
Bus	80	4,579.1	1.7
Heavy Rail	79	2,033.5	3.9
Commuter Rail	92	343.5	26.8
Light Rail	15	249.3	6.0
Demand Response	6	54.9	10.9
Total	272	7,260.3	
Weighted Average			3.7

Collision and Non-Collision Incidents by Mode

The number of collision and non-collision incidents by mode is presented in **Exhibit 5-8**. Bus accounted for the greatest portion of collision incidents with 93 percent. For non-collision incidents, Bus accounted for 51.1 percent and Heavy Rail accounted for 37.5 percent.

Collision and Non-Collision Incidents by Mode
Directly Operated Service
1995

Exhibit 5-8

Mode	Collision Incidents	Non-Collision Incidents	Total
Bus	23,505	18,638	42,143
Heavy Rail	640	13,676	14,316
Commuter Rail	201	2,646	2,847
Light Rail	291	980	1,271
Demand Response	635	532	1,167
Total	25,272	36,472	61,744

Reliability and Maintenance Effectiveness

Introduction

This chapter discusses measures of service quality, such as service reliability and the effectiveness of transit maintenance. While there are numerous measures of service quality in the transit industry, the data presented in this chapter are based on information reported by the nation's transit agencies.

Chapter Organization

Chapter 6 reviews service reliability in terms of the number of vehicle revenue miles between roadcalls and discusses maintenance effectiveness by examining maintenance expense per vehicle mile of service by mode.

General Notes

Before reviewing this chapter, some items should be noted. The appropriate definition of roadcalls and consistent reporting of roadcalls within the transit industry remains unresolved. Roadcalls discussed herein are roadcalls for mechanical failure as defined in the *1995 Reporting Manual.* Thus, revenue service interruptions caused by failure of some mechanical element of the revenue vehicle are considered. These interruptions include breakdowns of air equipment, brushes, fuel system, engine, steering and front axle, rear axle and suspension, torque convertors, electrical units, and heating and cooling systems. These revenue service interruptions are ones that prevent a vehicle from running and that require someone other than the vehicle operator or crew member to restore the vehicle to an operating condition. Please note that roadcalls do not measure the number of times that vehicles in revenue service are out of service. Many situations exist in which a vehicle in revenue service is placed out of service for non-mechanical reasons. For example, accidents are events not necessarily counted as roadcalls in the National Transit Database (NTD) because an accident may be unrelated to the vehicle's mechanical failure.

NTD reporting deals with maintenance data only for directly operated service in the 1995 report year. Purchased transportation expenses were not reported as individual maintenance functions; instead, they were generally reported with total purchased transportation costs. These are reported as either vehicle operations or general administration expenses.

Maintenance Performance Measures: Maintenance Expense per Vehicle Mile

Maintenance costs will vary greatly by mode due to differences in infrastructure, such as vehicle type, complexity and fixed guideway. Rail modes have higher maintenance costs partially due to their fixed guideway nature. **Exhibit 6-1** displays the maintenance costs per vehicle mile for the 1991-1995 period. All modes experienced decreases in maintenance costs per mile except Bus. Rail modes experienced higher costs than Bus and Demand Response. Among rail modes, Light Rail is the highest with a cost of $4.78 per vehicle mile.

Exhibit 6-1

Maintenance Expense per Vehicle Mile by Mode
1991-1995

Mode	1991	1992	1993	1994	1995
Bus	$1.17	$1.22	$1.25	$1.31	$1.34
Heavy Rail	2.90	2.99	2.76	2.83	2.79
Commuter Rail	3.87	4.00	3.97	4.30	3.96
Light Rail	4.31	4.42	4.73	5.08	4.78
Demand Response	0.40	0.40	0.39	0.36	0.35

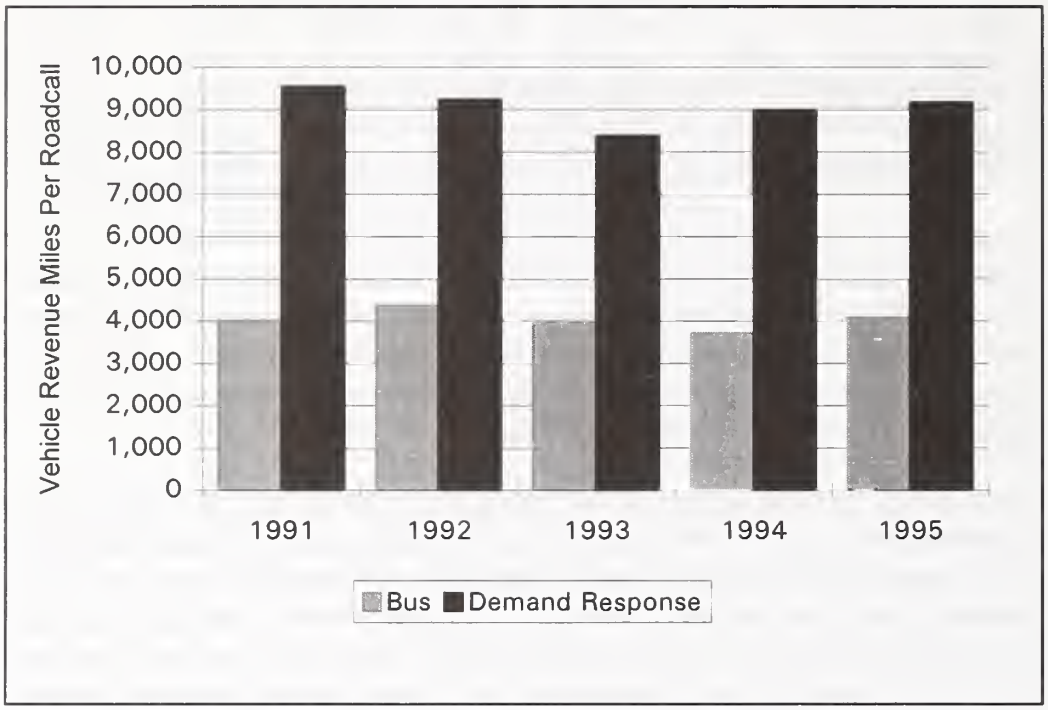
Vehicle Revenue Miles per Mechanical Roadcall

Reporting of roadcall data for the NTD was required only for directly operated non-fixed guideway modes in the 1995 report year. Transit Agencies do not use uniform and consistent criteria in reporting revenue interruptions for rail modes. Thus, the only data available that are sufficient for a historical comparison are the data for Bus and Demand Response because other non-fixed guideway modes have minimal participation in the NTD.

As shown in **Exhibit 6-2**, Bus experienced decreases in revenue miles between roadcalls for the 1992-1994 period. The trend changed in 1995 with an increase of 9.3 percent. Demand Response decreased in revenue miles per mechanical roadcall from 1991 to 1993; however, this figure increased in 1995, reaching the same level observed in 1992. The increase in 1995 is 9.3 percent compared with 1993. Both Bus and Demand Response show increases in revenue miles between roadcalls in 1995. This may be partially explained by the substantial increase in the acquisition of new rolling stock and other capital investments directly related to service reliability and maintenance effectiveness.

Vehicle Revenue Miles per Mechanical Roadcall
Directly Operated Service
1991-1995

Exhibit 6-2



The ratio of vehicle maintenance expense to the total operating expense for directly operated service is presented in **Exhibit 6-3**.

Ratio of Vehicle Maintenance Expenses to Total Operating Expenses
Directly Operated Service
(Millions)
1991-1995

Exhibit 6-3

Year	Vehicle Maintenance Expenses	Total Operating Expenses	Ratio of Vehicle Maintenance Expenses to Total Operating Expenses
1991	$2,871.9	$14,186.0	20.2%
1992	2,888.5	14,250.0	20.3%
1993	2,888.5	14,605.0	19.8%
1994	3,101.0	15,331.5	20.2%
1995	3,110.5	15,075.9	20.6%

Key Modal Characteristics and Uses of Capital by Transit Agencies

Introduction

The exhibits and discussion in this chapter provide data on operations, performance, infrastructure, and uses of capital for the 15 largest Bus and Demand Response transit agencies and for all transit agencies operating Heavy Rail, Commuter Rail, Light Rail, Trolleybus, Ferryboat, and Automated Guideway systems. Operational data is presented for both directly operated and purchased transportation services.

Chapter Organization

Three exhibits are presented for each of the following modes: Bus, Heavy Rail, Commuter Rail, Light Rail, Demand Response, Trolleybus, Ferryboat, and Automated Guideway. **Exhibits 7-1 through 7-31** provide data on service, performance indicators, infrastructure, and uses of capital for each mode.

For each mode, four exhibits are presented with a brief synopsis of the data. The first exhibit reflects basic information on each system's operations including operating expense, vehicle miles, vehicle hours, unlinked passenger trips, and passenger miles. The second exhibit offers measures of cost, service effectiveness and efficiency. The third exhibit profiles infrastructure characteristics such as directional route miles, miles of track, and stations. The fourth exhibit presents capital investment information by category of use (rolling stock, facilities and other) for all modes listed above except Demand Response.

Bus Agencies

The 15 Bus agencies addressed in **Exhibits 7-1, 7-2, 7-3** and **7-4** are those with the largest number of vehicles operated in maximum service (public agencies directly operating their services and private providers under contract to public agencies). These 15 agencies dominate the service categories presented in **Exhibit 7.1**, and account for more than 53 percent of the unlinked Bus passenger trips made in the United States in 1995. These agencies also account for over 50 percent of Bus passenger miles as well as 41.2 percent of Bus revenue miles and 45 percent of Bus revenue hours.

The private sector plays a secondary role in the production and consumption of public transportation by Bus for these agencies. For the 15 largest Bus providers nationwide, 90.4 percent of the operating expenses are consumed by public agencies directly generating their services. In terms of service supplied, public agencies directly generate 85.7 percent of vehicle revenue miles for the 15 largest providers of Bus service. In terms of unlinked passenger trips, the rate is 93.6 percent. Individually, the private sector contributes substantially to agencies such as New Jersey Transit and New York City Department of Transportation. The

Exhibit 7-1

Key Bus Operating Characteristics of Transit Agencies
1995

ST	Agency Name	Type of Service	Operating Expense (000s)	Vehicle Revenue Mile (000s)	Vehicle Revenue Hour (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
CA	LA-LACMTA-Metro	DO	$558,133.1	76,092.8	6,310.0	343,065.0	1,082.9	1,272,974.6
CA	LA-LACMTA-Metro	PT	4,430.4	1,465.5	75.0	1,281.2	4.8	9,937.9
	total		562,563.5	77,558.3	6,385.0	344,346.2	1,087.6	1,282,912.5
CO	Denver-RTD	DO	111,181.5	21,727.6	1,232.3	53,052.1	181.2	219,681.5
CO	Denver-RTD	PT	29,180.0	6,990.3	465.8	9,712.8	30.5	30,518.1
	total		140,361.5	28,718.0	1,698.1	62,764.9	211.7	250,199.6
DC	Washington-WMATA	DO	301,012.4	35,818.9	3,216.9	146,589.9	509.7	444,776.3
IL	Chicago-RTA-CTA	DO	503,015.0	70,680.9	6,831.1	306,075.6	994.3	766,588.2
MA	Boston-MBTA	DO	200,811.6	23,251.5	1,937.6	103,850.0	331.3	278,837.3
MA	Boston-MBTA	PT	6,798.3	3,120.6	155.5	2,429.6	9.0	44,681.7
	total		207,609.9	28,372.1	2,093.2	106,279.6	340.2	323,519.0
MD	Baltimore-Maryland-MTA	DO	130,406.6	18,583.8	1,662.7	85,586.7	293.3	247,402.9
MD	Baltimore-Maryland-MTA	PT	7,158.3	1,761.9	71.9	1,387.5	5.4	35,706.9
	total		137,564.9	20,345.5	1,734.6	86,974.2	298.7	283,109.9
MN	Minneapolis-St. Paul-MCTO	DO	124,891.1	22,836.8	1,647.1	61,058.9	218.0	253,081.6
MN	Minneapolis-St. Paul-MCTO	PT	311.5	87.1	4.9	51.0	0.2	133.8
	total		125,202.6	22,923.8	1,652.1	61,109.9	218.2	253,215.4
NJ	New Jersey Transit	DO	379,557.1	64,198.7	4,202.5	125,559.6	431.8	723,836.2
NJ	New Jersey Transit	PT	162,784.8	47,919.8	2,695.7	64,261.8	220.2	796,282.4
	Total		542,341.9	112,118.4	6,898.3	189,821.4	652.0	1,520,118.5
NY	NY-MTA-NYCTA	DO	1,050,279.6	88,414.0	11,269.1	658,518.7	2,159.6	1,349,409.4
NY	New York City DOT	PT	208,547.6	21,366.1	2,190.6	76,984.1	257.2	336,568.8
PA	Philadelphia-SEPTA	DO	294,150.6	34,107.2	3,321.9	163,117.9	562.5	451,542.2
PA	Philadelphia-SEPTA	PT	67.0	39.5	1.6	5.2	0.1	87.8
	total		294,217.7	34,146.8	3,323.5	163,123.1	562.5	451,610.0
PA	Pittsburgh-PAT	DO	146,481.2	23,991.6	1,855.9	64,357.3	217.7	255,052.0
TX	Dallas-DART	DO	119,509.7	19,060.6	1,351.1	43,880.6	154.3	173,271.1
TX	Dallas-DART	PT	25,068.1	7,710.9	434.1	7,115.6	27.3	54,870.0
	total		144,577.7	26,771.5	1,785.2	50,996.1	181.6	228,141.0
TX	Houston-Metro	DO	166,876.7	35,775.6	2,413.8	78,110.5	264.0	410,946.4
TX	Houston-Metro	PT	6,550.8	1,698.2	64.6	1,458.3	5.8	27,547.1
	total		173,427.5	37,473.8	2,478.4	79,568.8	269.8	438,493.5
WA	Seattle-Metro	DO	177,818.8	27,799.7	2,018.3	56,748.4	191.7	376,567.1
WA	Seattle-Metro	PT	4,232.5	1,285.8	87.2	718.3	2.4	3,815.0
	total		182,051.3	29,085.4	2,105.5	57,466.7	194.1	380,182.1
		DO Total	$4,264,125.0	562,339.4	49,270.5	2,289,571.1	7,592.4	7,223,966.7
		PT Total	455,129.3	93,445.5	8,247.0	165,405.3	562.6	1,339,929.6
		Total	$4,719,254.3	655,785.0	55,517.5	2,454,976.3	8,154.9	8,563,896.3
		Percent of DO Bus	52.6	40.7	44.9	54.3	50.4	49.8
		Percent of PT Bus	55.7	46.9	48.8	50.4	46.8	56.0
		Percent of National Total	52.8	41.2	45.0	53.6	50.0	50.3

New York City Department of Transportation contracts all of its Bus service with private providers.

Performance indicators for the top 15 Bus providers are displayed in **Exhibit 7-2.** On average, the top 15 have a higher cost per vehicle revenue mile and vehicle revenue hour than the national average (27.7 percent and 16.9 percent higher respectively). In addition, on average, the top 15 agencies and the average of all Bus providers have similar levels of cost effectiveness. The top 15's service effectiveness is better than the national average (nearly 30 percent higher as measured by unlinked passenger trips per vehicle revenue mile). It should be noted that performance indicators are given for agencies without indication of the ratios for the public and private component of their services.

As demonstrated in **Exhibit 7-2**, 3.74 unlinked passenger trips per vehicle revenue mile are realized on average by the combination of the top 15 Bus systems compared with 2.88 for all Bus agencies. However, it should be noted that, only 8 of the top 15 agencies demonstrate greater unlinked passenger trips per vehicle revenue mile than the 2.88 average for all Bus agencies.

Key Bus Performance Indicators of Transit Agencies
1995

Exhibit 7-2

ST	Agency Name	Operating Expense: Per Vehicle Revenue Mile (VRM)	Operating Expense: Per Vehicle Revenue Hour (VRH)	Operating Expense: Per Unlinked Passenger Trip (UPT)	Operating Expense: Per Passenger Mile (PM)	Passenger Trips: Per Vehicle Revenue Mile (VRM)	Passenger Trips: Per Vehicle Revenue Hour (VRH)	Passenger Miles: Per Vehicle Revenue Hour (VRH)	Vehicle Revenue Miles: Per Vehicle Revenue Hour (MPH)
CA	LA-LACMTA-Metro	$7.25	$88.11	$1.63	$0.44	4.44	53.93	200.93	12.15
CO	Denver-RTD	4.89	82.66	2.24	0.56	2.19	36.96	147.34	18.91
DC	Washington-WMATA	8.40	93.57	2.05	0.68	4.09	45.57	138.26	11.13
IL	Chicago-RTA-CTA	7.12	73.64	1.64	0.66	4.33	44.81	112.22	10.35
MA	Boston-MBTA	7.87	99.18	1.95	0.64	4.03	50.77	154.56	12.80
MD	Baltimore-Maryland-MTA	6.76	79.31	1.58	0.49	4.27	50.14	163.22	11.73
MN	Minneapolis-St. Paul-MCTO	5.46	75.79	2.05	0.49	2.67	36.99	153.27	13.88
NJ	New Jersey Transit	4.84	78.62	2.86	0.36	1.69	27.52	220.36	16.25
NY	NY-MTA-NYCTA	11.88	93.20	1.59	0.78	7.45	58.44	119.74	7.85
NY	New York City DOT	9.76	95.20	2.71	0.62	3.60	35.14	153.64	9.75
PA	Philadelphia-SEPTA	8.62	88.53	1.80	0.65	4.78	49.08	135.88	10.27
PA	Pittsburgh-PAT	6.11	78.93	2.28	0.57	2.68	34.68	137.43	12.93
TX	Dallas-DART	5.40	80.98	2.84	0.63	1.90	28.57	127.79	15.00
TX	Houston-Metro	4.63	69.98	2.18	0.40	2.12	32.10	176.93	15.12
WA	Seattle-Metro	6.26	86.46	3.17	0.48	1.98	27.29	180.57	13.81
	Average of Agencies	$7.20	$85.00	$1.92	$0.55	3.74	44.22	154.26	11.81
	National Average for Bus Mode	$5.64	$72.74	$1.96	$0.53	2.88	37.12	137.96	12.90

Exhibit 7-2 also reflects the low service efficiency of these 15 Bus agencies. Operating expense per vehicle revenue mile and per vehicle revenue hour for these agencies are $7.20 and $85.00, respectively, compared with $5.64 per vehicle revenue mile and $72.74 per vehicle revenue hour for all Bus agencies. Only 5 of the top 15 agencies posted figures below the national average. In terms of operating expense per unlinked passenger trip and operating expense per passenger mile, these 15 agencies averaged $1.92 and $0.55, respectively. Nationally, the average figures for Bus are $1.96 and $0.53. Thus, in terms of cost effectiveness, these 15 agencies are more in line with the national average for Bus mode.

Exhibit 7-3 indicates that the majority of the 15 agencies have at least some exclusive or shared rights-of-way for their Bus operations, with 8 of the systems having more than 20 directional route miles of such rights-of-way. Data in **Exhibit 7-3** reflect fixed guideway operated by each Bus transit agency. In many larger metropolitan areas, several Bus agencies operate on the same fixed guideway segments. These 15 agencies also account for over 43 percent of the buses operated in maximum service.

Exhibit 7-4 provides capital investment information for the Bus operators presented in previous exhibits. The exhibit reflects the significant investment of their capital funds in facilities and other expenditures, accounting for over 64 percent of the total national capital investment for Bus operators.

Exhibit 7-3

Key Bus Infrastructure Characteristics of Transit Agencies 1995

Agency Name	Fixed Guideway Directional Route Miles	Directional Route Miles Exclusive ROW	Directional Route Miles Controlled ROW	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Average Fleet Age
LA-LACMTA-Metro	24.5	24.5	0.0	1,843	2,211	9.0
Denver-RTD	26.6	1.9	24.7	683	825	6.7
Washington-WMATA	45.9	0.0	45.9	1,283	1,442	11.3
Chicago-RTA-CTA	5.4	5.4	0.0	1,657	2,028	6.2
Boston-MBTA	2.4	2.4	0.0	871	1,135	8.0
Baltimore-Maryland-MTA	11.8	0.0	11.8	762	925	7.9
Minneapolis-St. Paul-MCTO	116.4	25.7	90.7	849	1,006	5.9
New Jersey Transit	4.7	0.0	4.7	2,767	3,331	6.4
NY-MTA-NYCTA	38.8	2.6	36.2	3,094	3,557	8.7
New York City DOT	0.0	0.0	0.0	893	1,101	7.1
Philadelphia-SEPTA	3.6	2.5	1.1	1,110	1,439	10.8
Pittsburgh-PAT	41.3	41.3	0.0	726	824	6.4
Dallas-DART	17.8	8.5	9.3	741	873	9.3
Houston-Metro	131.4	127.4	4.0	985	1,210	7.2
Seattle-Metro	131.6	126.2	5.4	847	1,043	11.3
Individual Agencies Total	602.2	368.4	233.8	19,111	22,950	
Weighted Average						8.1
Total Bus Mode	1,029.5	530.2	499.3	43,577	53,741	
Weighted Average						8.5

Exhibit 7-4

Uses of Bus Capital Funds by Transit Agencies (Thousands) 1995

ST	Agency Name	Rolling Stock (000s)	Facilities and Other (000s)	Total (000s)
CA	LA-LACMTA-Metro	$22,135.7	$193,881.3	$216,017.0
CO	Denver-RTD	142.5	18,442.9	$18,585.4
DC	Washington-WMATA	22,991.2	35,195.8	$58,186.9
IL	Chicago-RTA-CTA	91,142.5	37,153.1	$128,295.6
MA	Boston-MBTA	52,426.4	381.9	$52,808.3
MD	Baltimore-Maryland-MTA	12,046.7	8,203.0	$20,249.8
MN	Minneapolis-St. Paul-MCTO	23,613.9	9,451.1	$33,065.0
NJ	New Jersey Transit	34,216.7	34,081.0	$68,297.7
NY	NY-MTA-NYCTA	88,950.0	29,740.0	$118,690.0
NY	New York City DOT	12,185.8	13,814.0	$25,999.8
PA	Philadelphia-SEPTA	14,536.5	18,451.1	$32,987.5
PA	Pittsburgh-PAT	11,449.9	52,517.7	$63,967.5
TX	Dallas-DART	1,715.6	24,594.0	$26,309.6
TX	Houston-Metro	6,525.3	108,872.1	$115,397.3
WA	Seattle-Metro	5,199.9	35,101.6	$40,301.6
	Total	$399,278.6	$619,880.4	$1,019,159.1
	Percent of National Bus Total	45.5%	64.4%	55.4%

Heavy Rail Agencies

The Heavy Rail agencies listed represent the total number of Heavy Rail operators in the United States, providing a combined total of 7,973 vehicles in maximum service. The dominance of three New York City metropolitan area agencies is demonstrated by the data presented. These agencies are the New York City Transit Authority, Staten Island Rapid Transit Operating Authority, and the Port Authority Trans-Hudson Corporation. **Exhibit 7-5** shows that 62 percent of Heavy Rail operating expenses in the United States in 1995 are accounted for by these New York City agencies. These agencies also provided 61 percent of the Heavy Rail vehicle revenue miles operated, 69 percent of the Heavy Rail vehicle revenue hours operated, 59 percent of Heavy Rail passenger miles, and 64 percent of all Heavy Rail riders.

Exhibit 7-5

Key Heavy Rail Operating Characteristics of Transit Agencies
1995

ST	Agency Name	Type of Service	Operating Expense (000s)	Vehicle Revenue Miles (000s)	Vehicle Revenue Hours (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
CA	LA-LACMTA-Metro	DO	$19,610.3	694.9	50.8	5,887.7	19.1	8,857.6
CA	San Francisco-BART	DO	211,042.6	43,849.6	1,238.9	76,331.5	261.8	907,520.4
DC	Washington-WMATA	DO	341,426.2	41,574.6	1,630.2	198,380.1	687.1	1,056,911.0
FL	Miami-MDTA	DO	45,314.8	5,819.0	225.4	14,204.0	47.1	115,387.3
GA	Atlanta-MARTA	DO	79,830.7	21,879.0	803.0	70,351.0	227.5	397,366.9
IL	Chicago-RTA-CTA	DO	282,554.2	45,282.9	1,891.5	135,461.6	465.8	856,551.7
MA	Boston-MBTA	DO	148,255.7	20,812.5	946.0	113,490.2	362.0	404,306.2
MD	Baltimore-Maryland-MTA	DO	33,644.6	3,983.6	142.6	10,556.5	37.6	53,479.4
NJ	Philadelphia-PATCO	DO	26,673.1	4,193.0	144.6	10,880.5	39.3	95,760.8
NY	NY-MTA-NYCTA	DO	2,006,311.2	302,370.0	16,573.0	1,234,598.5	4,073.3	5,909,072.4
NY	NY-MTA-Staten Island	DO	19,739.0	1,842.6	87.1	5,069.4	19.0	37,159.7
NY	Port Authority-PATH	DO	161,347.0	12,818.4	635.7	64,734.2	223.0	281,507.8
OH	Cleveland-RTA	DO	21,681.1	1,988.6	93.4	6,949.4	23.8	51,333.3
PA	Philadelphia-SEPTA	DO	125,518.3	14,675.5	743.8	86,611.3	308.2	383,606.5
	Total		$3,522,948.9	521,784.2	25,205.9	2,033,506.0	6,794.6	10,558,821.2

As seen in **Exhibit 7-6**, 6 of the reporting transit agencies exceed the average of 3.09 unlinked passenger trips per vehicle revenue mile and 6 exceed the average of 80.68 unlinked passenger trips per vehicle revenue hour. This reflects a high service effectiveness for these operators.

Exhibit 7-7 also reflects the dominance of the New York City agencies. Nearly 51 percent of all Heavy Rail stations are served by the three New York City agencies; 37.7 percent of Heavy Rail route miles and 43.9 percent of Heavy Rail track miles are reported by the New York City area. These three agencies accounted for almost 64 percent of the vehicles operated in maximum service and 61 percent of the vehicles available for maximum service.

Exhibit 7-8 provides capital investment information for Heavy Rail in 1995. As in previous exhibits, New York City agencies account for the majority of capital investment in 1995 at 36.1 percent of the total capital invested in Heavy Rail.

Exhibit 7-6

Key Heavy Rail Performance Indicators of Transit Agencies
1995

ST	Agency Name	Operating Expense: Per Vehicle Revenue Mile (VRM)	Operating Expense: Per Vehicle Revenue Hour (VRH)	Operating Expense: Per Unlinked Passenger Trip (UPT)	Operating Expense: Per Passenger Mile (PM)	Passenger Trips: Per Vehicle Revenue Mile (VRM)	Passenger Trips: Per Vehicle Revenue Hour (VRH)	Passenger Miles: Per Vehicle Revenue Hour (VRH)	Vehicle Revenue Miles: Per Vehicle Revenue Hour (MPH)
CA	LA-LACMTA-Metro	$28.22	$385.98	$3.33	$2.21	8.47	115.89	174.34	13.68
CA	San Francisco-BART	4.81	170.35	2.76	0.23	1.74	61.61	732.55	35.40
DC	Washington-WMATA	8.21	209.44	1.72	0.32	4.77	121.69	648.34	25.50
FL	Miami-MDTA	7.79	201.08	3.19	0.39	2.44	63.03	512.03	25.82
GA	Atlanta-MARTA	3.65	99.41	1.13	0.20	3.22	87.61	494.84	27.25
IL	Chicago-RTA-CTA	6.24	149.38	2.09	0.33	2.99	71.62	452.84	23.94
MA	Boston-MBTA	7.12	156.71	1.31	0.37	5.45	119.97	427.38	22.00
MD	Baltimore-Maryland-MTA	8.45	236.01	3.19	0.63	2.65	74.05	375.14	27.94
NJ	Philadelphia-PATCO	6.36	184.48	2.45	0.28	2.59	75.25	662.31	29.00
NY	NY-MTA-NYCTA	6.64	121.06	1.63	0.34	4.08	74.49	356.55	18.24
NY	NY-MTA-Staten Island	10.71	226.59	3.89	0.53	2.75	58.19	426.57	21.15
NY	Port Authority-PATH	12.59	253.82	2.49	0.57	5.05	101.83	442.84	20.16
OH	Cleveland-RTA	10.90	232.19	3.12	0.42	3.49	74.42	549.74	21.30
PA	Philadelphia-SEPTA	8.55	168.76	1.45	0.33	5.90	116.45	515.75	19.73
	Average	$6.75	$139.77	$1.73	$0.33	3.90	80.68	418.90	20.70

Exhibit 7-7

Key Heavy Rail Infrastructure Characteristics of Transit Agencies
1995

ST	Agency Name	Fixed Guideway Directional Route Miles	Miles of Track	Number of Stations	Number of Accessible Stations	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Average Fleet Age
CA	LA-LACMTA-Metro	6.0	8.8	5	5	16	30	4.0
CA	San Francisco-BART	142.0	196.5	34	34	406	611	17.0
DC	Washington-WMATA	178.2	192.0	74	74	588	764	12.2
FL	Miami-MDTA	42.2	53.2	21	0	80	136	13.0
GA	Atlanta-MARTA	80.8	99.2	33	33	158	238	11.9
IL	Chicago-RTA-CTA	207.7	289.2	145	0	803	1,134	12.5
MA	Boston-MBTA	75.8	107.7	53	33	310	408	12.9
MD	Baltimore-Maryland-MTA	29.4	34.4	14	14	54	100	10.4
NJ	Philadelphia-PATCO	31.5	38.4	13	2	102	121	22.4
NY	NY-MTA-NYCTA	492.9	834.2	468	27	4,816	5,801	22.5
NY	NY-MTA-Staten Island	28.6	32.5	22	2	36	64	24.0
NY	Port Authority-PATH	28.6	43.1	13	6	282	342	22.8
OH	Cleveland-RTA	38.2	41.9	18	3	35	59	12.0
PA	Philadelphia-SEPTA	76.1	102.3	76	4	287	358	24.9
	Total	$1,458	2,073.4	989	237	7,973	10,166	
	Weighted Average							18.6

Commuter Rail Agencies

Exhibits 7-9, 7-10, 7-11, and **7-12** present all 15 Commuter Rail systems. This mode is dominated by four agencies: two agencies serving the New York City metropolitan area, one serving New Jersey, and one serving the Chicago metropolitan area. As shown in **Exhibit 7-9**, the systems serving the metropolitan areas of New York-New Jersey and Chicago accounted for 79.5 percent of the total operating expenses for Commuter Rail systems, 78.2 percent of the vehicle revenue miles, 77.6 percent of the vehicle revenue hours, 79.3 percent of the unlinked passenger trips, and 82.2 percent of the passenger miles. Therefore, three individual agencies and one Commuter Rail system (Chicago) are responsible for over 77 percent of service supplied and consumed for Commuter Rail in the nation.

Uses of Heavy Rail Capital Funds by Transit Agencies (Thousands) 1995

Exhibit 7-8

ST	Agency Name	Rolling Stock (000s)	Facilities and Other (000s)	Total (000s)
CA	LA-LACMTA-Metro	$22.8	$591.5	$614.3
CA	San Francisco-BART	86,431.5	267,141.9	$353,573.4
DC	Washington-WMATA	38,061.5	491,337.1	$529,398.7
FL	Miami-MDTA	2,480.0	34,845.3	$37,325.3
GA	Atlanta-MARTA	5,972.3	109,397.7	$115,369.9
HI	Honolulu-DTS	0.0	12,356.1	$12,356.1
IL	Chicago-RTA-CTA	13,063.8	203,728.2	$216,792.0
MA	Boston-MBTA	74,548.6	105,553.1	$180,101.7
MD	Baltimore-Maryland-MTA	726.2	33,982.1	$34,708.3
NJ	Philadelphia-PATCO	727.7	3,795.0	$4,522.7
NY	NY-MTA-NYCTA	17,310.0	865,523.0	$882,833.0
NY	NY-MTA-Staten Island	0.0	4,947.2	$4,947.2
NY	Port Authority-PATH	0.0	37,146.0	$37,146.0
OH	Cleveland-RTA	0.0	14,609.8	$14,609.8
PA	Philadelphia-SEPTA	13,740.3	122,465.4	$136,205.6
	Total	$253,084.7	$2,307,419.3	$2,560,504.0

Key Commuter Rail Operating Characteristics of Transit Agencies 1995

Exhibit 7-9

ST	Agency Name	Service	Operating Expense (000s)	Vehicle Revenue Miles (000s)	Vehicle Revenue Hours (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
CA	LA-SCRRA	PT	$52,048.3	4,037.6	97.0	4,401.7	17.3	155,080.4
CA	SF-CalTrain	PT	39,222.7	3,767.9	113.5	5,539.1	19.2	126,647.6
CA	San Diego-NCTD	PT	9,239.8	189.9	4.6	177.7	2.0	4,843.0
CT	Hartford-Conn DOT	PT	5,824.8	417.1	10.3	291.5	1.1	5,937.7
FL	Ft. Lauderdale-TCRA	PT	21,655.6	2,459.5	59.6	2,735.4	9.0	87,010.1
IL	Chicago-RTA-Metra	DO	317,105.2	31,717.7	989.6	63,841.8	239.5	1,359,225.7
IL	Chicago-RTA-Metra	PT	4,791.0	551.8	15.7	692.2	2.5	19,363.7
	Total		321,896.2	32,269.5	1,005.4	64,534.0	242.0	1,378,589.4
IN	NW IN-NICTD	DO	21,030.8	2,075.7	59.1	2,603.8	9.3	72,844.2
MA	Boston-MBTA	DO	108,717.9	15,482.4	492.0	25,495.2	92.2	476,457.0
MD	Baltimore-Maryland-MTA	PT	37,287.4	4,648.3	117.4	4,799.6	18.6	144,469.2
NJ	New Jersey Transit	DO	324,025.9	40,100.0	1,148.4	46,169.9	161.5	1,118,028.5
NJ	New Jersey Transit	PT	8,120.5	1,383.5	26.7	1,381.0	5.4	51,206.9
	Total		332,146.4	41,483.5	1,175.0	47,550.9	166.9	1,169,235.5
NY	NY-MTA-Long Island RR	DO	634,087.0	55,676.3	1,744.4	97,736.0	339.0	2,224,421.6
NY	NY-MTA-Metro North RR	DO	469,243.3	40,975.2	1,103.8	62,409.6	211.2	2,001,731.5
PA	Philadelphia-PennDOT	PT	2,153.3	569.7	11.0	88.8	0.3	5,908.4
PA	Philadelphia-SEPTA	DO	142,839.2	12,707.1	462.0	23,301.2	81.9	328,547.3
VA	VA-VRE	PT	13,657.6	1,033.2	29.2	1,840.1	7.4	62,301.7
		DO Total	$2,017,049.3	198,734.3	5,999.3	321,557.5	1,134.6	7,581,255.9
		PT Total	$194,001.0	19,058.5	484.8	21,947.2	82.9	662,768.6
		Total	$2,211,050.3	217,792.8	6,484.1	343,504.7	1,217.5	8,244,024.5

Private sector participation in generating Commuter Rail service is small, following a trend found in all transit modes except Demand Response. In 1995, contracting Commuter Rail services totaled 8.8 percent of the total operating expense for this mode. In fact, Commuter Rail has the largest share of service provided through contracting after Demand Response. It occupies first place among mass transit modes. Ten of the 15 Commuter Rail systems have the entire or part of their service provided through purchased transportation. In most cases, private providers are freight rail companies that have retained the ownership of the facilities and/or rolling stock. AMTRAK also has an important role as the provider for agencies such as Boston, MARC Services-Maryland, SCCRA and, VRE Virginia.

Performance indicators for Commuter Rail are displayed in **Exhibit 7-10**. The cost per revenue mile for Commuter Rail systems varies from $3.78 per revenue mile to $48.65 per revenue mile. The two largest operators of Commuter Rail are located in the New York City metropolitan area (Long Island Railroad and Metro North) . Each one shows a cost per mile higher than the national average (12.2 percent and 12.8 percent respectively). The long trip lengths and highly concentrated ridership during peak hours are the main factors affecting the cost effectiveness of Commuter Rail based on unlinked passenger trips and passenger miles. The cost per passenger mile is on average much smaller than the cost per unlinked passenger trips due to the long trip lengths of Commuter Rail.

Exhibit 7-10

Key Commuter Rail Performance Indicators of Transit Agencies
1995

		Operating Expense				Passenger Trips		Passenger Miles	Vehicle Revenue Miles
ST	Agency Name	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Unlinked Passenger Trip (UPT)	Per Passenger Mile (PM)	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (MPH)
CA	LA-SCRRA	$12.89	$536.75	$11.82	$0.34	1.09	45.39	1,599.28	41.64
CA	SF-CalTrain	10.41	345.72	7.08	0.31	1.47	48.82	1,118.30	33.21
CA	San Diego-NCTD	48.85	1,996.49	51.99	1.91	0.94	38.40	1,046.46	41.04
CT	Hartford-Conn DOT	13.97	564.97	19.98	0.98	0.70	28.28	575.91	40.45
FL	Ft. Lauderdale-TCRA	8.81	363.51	7.92	0.25	1.11	45.92	1,460.56	41.28
IL	Chicago-RTA-Metra	9.98	320.18	4.99	0.23	2.00	64.19	1,371.25	32.10
IN	NW IN-NICTD	10.13	355.73	8.08	0.29	1.25	44.04	1,232.12	35.11
MA	Boston-MBTA	7.02	220.96	4.28	0.23	1.85	51.82	968.38	31.47
MD	Baltimore-Maryland-MTA	8.02	317.72	7.77	0.28	1.03	40.90	1,231.01	39.61
NJ	New Jersey Transit	8.01	282.87	8.99	0.28	1.15	40.47	995.07	35.30
NY	NY-MTA-Long Island RR	11.39	363.49	6.49	0.29	1.78	56.03	1,275.18	31.92
NY	NY-MTA-Metro North RR	11.45	425.13	7.52	0.23	1.52	56.54	1,813.54	37.12
PA	Philadelphia-Penn DOT	3.78	196.54	24.28	0.36	0.16	8.10	539.29	52.00
PA	Philadelphia-SEPTA	11.24	309.20	8.13	0.43	1.83	50.44	711.19	27.51
VA	VA-VRE	13.22	467.66	7.42	0.22	1.78	63.01	2,133.33	35.38
	Average	$10.15	$340.99	$6.44	$0.27	1.58	52.98	1,271.41	33.59

Virginia Railway Express (VA-VRE) was the most cost effective system in 1995 in terms of expenses per passenger miles, while Boston was the most cost effective in terms of expenses per unlinked passenger trip. Commuter Rail's service effectiveness, as measured by unlinked passenger trips per vehicle revenue mile

mile is poor compared with other modes. However, this is not an indication of low service utilization. The main reason for the low Commuter Rail's service effectiveness relates to concentrated ridership during peak hours combined with the long distances traveled by commuters.

Exhibit 7-11 also demonstrates the dominance of New York City agencies, New Jersey and Chicago relative to infrastructure. Commuter Rail systems serving these areas account for 75.8 percent of the vehicles operated in maximum service, 52.4 percent of the fixed guideway directional route miles, and 56.8 percent of the Commuter Rail stations.

Key Commuter Rail Infrastructure Characteristics of Transit Agencies 1995 **Exhibit 7-11**

ST	Agency Name	Fixed Guideway Directional Route Miles	Miles of Track	Number of Stations	Number of Accessible Stations	Vehicles Operated for Maximum Service	Vehicles Available for Maximum Service	Average Fleet Age
CA	LA-SCRRA	667.0	475.0	41.0	41	112	122	2.6
CA	SF-CalTrain	153.6	157.4	34.0	14	82	93	9.9
CA	San Diego-NCTD	60.2	80.6	8.0	8	20	21	1.0
CT	Hartford-Conn DOT	65.6	68.3	7.0	7	12	34	27.0
FL	Ft. Lauderdale-TCRA	132.8	136.1	15.0	15	25	29	6.3
IL	Chicago-RTA-Metra	871.8	1,095.4	223.0	80	957	1,054	24.1
IN	NW IN-NICTD	138.4	89.0	18.0	7	45	56	9.7
MA	Boston-MBTA	574.3	494.1	102.0	50	307	346	7.4
MD	Baltimore-Maryland-MTA	373.4	455.1	40.0	12	112	137	22.9
NJ	New Jersey Transit	1,189.2	1,194.9	163.0	27	689	834	17.8
NY	NY-MTA-Long Island RR	638.2	701.1	134.0	15	982	1,185	24.2
NY	NY-MTA-Metro North RR	535.4	796.4	107.0	0	718	826	19.2
PA	Philadelphia-Penn DOT	144.0	144.0	14.0	4	9	12	18.8
PA	Philadelphia-SEPTA	442.8	694.8	181.0	25	283	343	20.6
VA	VA-VRE	175.0	190.0	17.0	17	60	71	19.5
	Total	6,161.7	6,772.2	1,104.0	322	4,413	5,163	
	Weighted Average							19.6

Uses of Capital funds for Commuter Rail operators is depicted in **Exhibit 7-12.**

Exhibits 7-13, 7-14, and **7-15** provide data for all Light Rail operators while **Exhibit 7-16** provides data for all agencies that invested capital dollars in Light Rail systems in 1995. **Light Rail Agencies**

Exhibit 7-13 demonstrates that the five following agencies, Massachusetts Bay Transportation Authority (MBTA) in Boston, Southeastern Pennsylvania Transportation Authority (SEPTA) in Philadelphia, San Francisco Municipal Railway (Muni), Los Angeles County Metropolitan Transportation Authority (LACMTA) in Los Angeles, and the San Diego Trolley, dominate service consumed statistics. These agencies reported 70 percent of the unlinked passenger trips made via Light Rail and 63.5 percent of the accumulated passenger miles.

In terms of service supplied, these five agencies also accounted for a majority of vehicle revenue miles and hours. Combined, they reported 55.4 percent of the vehicle revenue miles and 59.2 percent of vehicle revenue hours.

Uses of Commuter Rail Capital Funds by Transit Agencies (Thousands) 1995

Exhibit 7-12

ST	Agency Name	Rolling Stock (000s)	Facilities and Other (000s)	Total (000s)
CA	LA-Montebello	$0.0	$2,345.6	$2,345.6
CA	LA-SCRRA	19,503.2	100,807.1	$120,310.3
CA	San Diego-NCTD	17,473.6	26,515.6	$43,989.2
CA	SF-CalTrain	0.0	8,274.8	$8,274.8
CT	Hartford-Conn DOT	9,125.0	49,111.0	$58,236.0
FL	Ft. Lauderdale-TCRA	2,910.9	14,482.7	$17,393.6
IL	Chicago-RTA-Metra	58,473.2	143,127.8	$201,601.0
IN	NW IN-NICTD	541.1	7,127.1	$7,668.1
MA	Boston-MBTA	89,770.5	248,843.5	$338,614.0
MD	Baltimore-Maryland-MTA	26,457.0	17,666.8	$44,123.8
NJ	New Jersey Transit	115,295.4	175,423.1	$290,718.5
NY	NY-MTA-Long Island RR	9,939.5	188,985.7	$198,925.1
NY	NY-MTA-Metro North RR	49,336.6	193,122.2	$242,458.8
PA	Philadelphia-SEPTA	20,934.2	71,105.0	$92,039.3
TX	Dallas-DART	2,705.8	3,584.3	$6,290.1
TX	Fort Worth-The T	3,222.9	0.0	$3,222.9
VA	VA-VRE	1,277.6	11,646.7	$12,924.3
	Total	$426,966.7	$1,262,168.8	$1,689,135.5

Key Light Rail Operating Characteristics of Transit Agencies 1995

Exhibit 7-13

ST	Agency Name	Type of Service	Operating Expense (000s)	Vehicle Revenue Miles (000s)	Vehicle Revenue Hours (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
CA	LA-LACMTA-Metro	DO	$30,443.4	2,782.6	143.4	12,026.6	36.7	101,040.4
CA	Sacramento-RT	DO	13,951.3	1,747.5	96.9	7,063.7	23.8	33,547.5
CA	San Diego- The Trolley	DO	19,948.0	4,048.9	213.9	15,624.4	45.0	79,362.9
CA	San Francisco-Muni	DO	50,752.6	3,498.1	332.0	37,242.5	123.7	100,812.7
CA	San Jose-SCCTD	DO	22,401.3	1,661.5	107.8	5,659.3	18.1	26,413.1
CO	Denver-RTD	DO	5,629.1	428.0	29.9	4,054.4	13.1	11,005.8
LA	New Orleans-RTA	DO	5,941.1	712.0	77.8	7,069.2	20.8	15,789.0
MA	Boston-MBTA	DO	75,380.3	5,523.0	368.2	71,519.1	216.9	160,826.2
MD	Baltimore-Maryland-MTA	DO	17,769.2	2,147.1	125.0	5,811.5	19.4	37,698.0
MO	St. Louis-Bi-State	DO	14,715.8	2,527.2	100.1	12,488.2	37.0	67,624.2
NJ	New Jersey Transit	DO	5,118.4	653.7	43.6	3,932.9	13.5	12,164.9
NY	Buffalo-NFTA	DO	13,774.6	891.9	74.8	7,598.1	26.1	17,169.4
OH	Cleveland-RTA	DO	12,484.6	1,015.6	61.5	4,445.0	15.3	27,675.4
OR	Portland-Tri-Met	DO	16,397.5	1,537.9	103.7	7,779.5	24.2	39,690.0
PA	Philadelphia-SEPTA	DO	42,676.3	2,943.3	327.1	38,065.5	130.9	85,865.7
PA	Pittsburgh-PAT	DO	25,634.4	1,624.5	105.4	7,996.1	27.2	41,001.2
TN	Memphis-MATA	DO	1,114.3	125.7	19.3	512.2	1.4	392.4
TX	Galveston-Island Transit	DO	253.2	19.9	4.2	117.3	0.3	315.3
WA	Seattle-Metro	DO	861.2	22.3	6.1	296.9	1.8	307.4
	Total		$375,246.6	33,910.8	2,340.5	249,302.5	795.4	858,701.5

Performance measures for Light Rail are provided in **Exhibit 7-14**. The agencies with the best service effectiveness as measured by unlinked passenger trips per vehicle revenue mile are Seattle-Metro, Boston (MBTA), Philadelphia (SEPTA), and San Francisco-Muni. These agencies carry over 10 unlinked passenger trips per vehicle revenue mile while the national average is 7.35 unlinked passenger trips per vehicle revenue mile. The most efficient agencies (operating expense per vehicle revenue mile) are St. Louis-Bi-State, San Diego Trolley, and New Jersey Transit. These agencies have a cost per mile of less than $8, well below the national average of $11.07 per revenue mile.

Key Light Rail Performance Indicators of Transit Agencies 1995 **Exhibit 7-14**

		Operating Expense				Passenger Trips		Passenger Miles	Vehicle Revenue Miles
ST	Agency Name	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Unlinked Passenger Trip (UPT)	Per Passenger Mile (PM)	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (MPH)
CA	LA-LACMTA-Metro	$10.94	$212.37	$2.53	$0.30	4.32	83.90	704.84	19.41
CA	Sacramento-RT	7.98	143.93	1.98	0.42	4.04	72.88	346.11	18.03
CA	San Diego- The Trolley	4.93	93.28	1.28	0.25	3.86	73.06	371.11	18.93
CA	San Francisco-Muni	14.51	152.89	1.36	0.50	10.65	112.19	303.69	10.54
CA	San Jose-SCCTD	13.48	207.86	3.96	0.85	3.41	52.51	245.09	15.42
CO	Denver-RTD	13.15	188.55	1.39	0.51	9.47	135.80	368.64	14.34
LA	New Orleans-RTA	8.34	76.34	0.84	0.38	9.93	90.84	202.89	9.15
MA	Boston-MBTA	13.65	204.73	1.05	0.47	12.95	194.24	436.79	15.00
MD	Baltimore-Maryland-MTA	8.28	142.15	3.06	0.47	2.71	46.49	301.58	17.18
MO	St. Louis-Bi-State	5.82	146.94	1.18	0.22	4.94	124.70	675.24	25.23
NJ	New Jersey Transit	7.83	117.42	1.30	0.42	6.02	90.23	279.08	15.00
NY	Buffalo-NFTA	15.44	184.24	1.81	0.80	8.52	101.63	229.65	11.93
OH	Cleveland-RTA	12.29	202.92	2.81	0.45	4.38	72.25	449.82	16.51
OR	Portland-Tri-Met	10.66	158.19	2.11	0.41	5.06	75.05	382.90	14.84
PA	Philadelphia-SEPTA	14.50	130.48	1.12	0.50	12.93	116.38	262.52	9.00
PA	Pittsburgh-PAT	15.78	243.21	3.21	0.63	4.92	75.87	389.01	15.41
TN	Memphis-MATA	8.87	57.80	2.18	2.84	4.08	26.57	20.36	6.52
TX	Galveston-Island Transit	12.75	60.13	2.16	0.80	5.91	27.86	74.87	4.72
WA	Seattle-Metro	38.65	140.16	2.90	2.80	13.33	48.32	50.03	3.63
	Average	$11.07	$160.33	$1.51	$0.44	7.35	106.52	366.88	14.49

Exhibit 7-15 shows that the same five agencies mentioned in **Exhibit 7-13** accounted for 60.2 percent of the vehicles operated in maximum service, over 47 percent of the Light Rail stations, and 45.7 percent of the directional route miles.

Exhibit 7-16 shows data on capital invested in Light Rail systems in 1995.

Demand Response Agencies

The 15 Demand Response agencies listed in **Exhibits 7-17, 7-18, and 7-19** are those reporting the most vehicles operating in maximum service. As **Exhibit 7-17** demonstrates, these agencies reported 33.6 percent of the total Demand Response service operated in the United States in terms of vehicle revenue miles. These agencies carried 27.6 percent of the nation's Demand Response riders and accounted for over 30 percent of the Demand Response passenger miles. This is the only mode in the NTD in which the participation of the private sector is higher than that of the public sector's. Private providers generated over 90 percent of the vehicle revenue miles, 91.8 percent of the vehicle revenue hours, and 92.7 percent of the unlinked passenger trips in 1995.

Exhibit 7-15

Key Light Rail Infrastructure Characteristics of Transit Agencies 1995

ST	Agency Name	Fixed Guideway Directional Route Miles	Miles of Track	Number of Stations	Number of Accessible Stations	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Average Fleet Age
CA	LA-LACMTA-Metro	43.2	46.7	22	22	36	54	6.0
CA	Sacramento-RT	36.2	34.0	28	0	32	36	6.9
CA	San Diego- The Trolley	41.5	41.5	35	35	59	71	9.1
CA	San Francisco-Muni	49.7	54.2	11	9	99	127	23.7
CA	San Jose-SCCTD	39.0	41.1	33	5	32	55	14.7
CO	Denver-RTD	10.6	12.7	15	15	11	11	2.0
LA	New Orleans-RTA	16.0	12.7	2	2	22	51	71.9
MA	Boston-MBTA	55.9	77.5	95	0	142	201	14.1
MD	Baltimore-Maryland-MTA	43.6	35.3	24	24	30	35	3.0
MO	St. Louis-Bi-State	34.0	36.2	18	18	26	31	2.3
NJ	New Jersey Transit	8.3	8.3	11	0	16	22	48.5
NY	Buffalo-NFTA	12.4	14.1	14	7	23	27	11.0
OH	Cleveland-RTA	26.7	28.9	29	0	26	47	14.0
OR	Portland-Tri-Met	30.2	29.1	27	3	23	26	10.1
PA	Philadelphia-SEPTA	69.3	171.0	64	0	113	147	15.9
PA	Pittsburgh-PAT	38.1	46.5	13	0	44	71	18.3
TN	Memphis-MATA	4.3	4.0	20	20	5	7	12.0
TX	Galveston-Island Transit	4.9	4.9	3	3	4	4	7.0
WA	Seattle-Metro	3.7	2.1	14	14	3	5	67.2
	Total	587.6	700.8	478	177	746	1,028	
	Weighted Average							16.2

Exhibit 7-16

Uses of Light Rail Capital Funds by Transit Agencies (Thousands) 1995

ST	Agency Name	Rolling Stock (000s)	Facilities and Other (000s)	Total (000s)
CA	LA-LACMTA-Metro	$75.2	$9,078.6	$9,153.8
CA	Sacramento-RT	0.0	4,080.9	$4,080.9
CA	San Francisco-Muni	9,546.4	88,715.4	$98,261.8
CA	San Jose-SCCTD	0.0	32,390.8	$32,390.8
CO	Denver-RTD	9,375.0	4,791.4	$14,166.4
LA	New Orleans-RTA	1,380.6	0.0	$1,380.6
MA	Boston-MBTA	1,706.8	11,281.5	$12,988.4
MD	Baltimore-Maryland-MTA	454.2	18,372.2	$18,826.5
MO	St. Louis-Bi-State	155.5	5,537.4	$5,692.9
NC	Charlotte-CTS	0.0	6.8	$6.8
NJ	New Jersey Transit	0.0	408.3	$408.3
NY	Buffalo-NFTA	308.4	168.5	$476.9
OH	Cincinnati-SORTA	0.0	705.4	$705.4
OH	Cleveland-RTA	0.0	33,446.3	$33,446.3
OR	Portland-Tri-Met	8,908.8	213,040.6	$221,949.4
PA	Philadelphia-SEPTA	6,946.5	279.8	$7,226.3
PA	Pittsburgh-PAT	93.9	5,442.2	$5,536.1
TN	Memphis-MATA	721.8	2.9	$724.7
TX	Dallas-DART	31,042.4	180,438.1	$211,480.6
UT	Salt Lake City-UTA	0.0	2,689.6	$2,689.6
WA	Seattle-Metro	0.0	4,089.7	$4,089.7
	Total	$70,715.6	$614,966.5	$685,682.1

Key Demand Response Operating Characteristics of Transit Agencies
1995

Exhibit 7-17

ST	Agency Name	Type of Service	Vehicle Revenue Miles (000s)	Vehicle Revenue Hours (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
CA	LA-OCTA	PT	4,699.3	359.6	1,173.4	4.5	7,988.7
FL	Ft. Lauderdale-Bct	PT	4,554.9	228.7	842.7	2.7	7,199.9
FL	Miami-MDTA	DO	1,016.2	67.6	51.7	0.1	652.9
		PT	7,743.5	499.7	813.8	2.7	8,552.4
	Total		8,759.7	567.3	865.5	2.9	9,205.3
HI	Honolulu-HDOT-Mayflower	PT	3,582.9	258.0	666.5	2.3	8,133.4
IL	Chicago-RTA-CTA	PT	6,993.5	743.4	1,270.3	4.1	10,228.9
IL	Chicago-RTA-Pace	DO	93.0	6.5	28.6	0.1	166.3
		PT	6,777.3	459.9	1,474.0	5.8	8,578.6
	Total		6,870.3	466.5	1,502.6	5.9	8,745.0
MA	Boston-MBTA	PT	5,413.1	446.5	807.3	2.7	5,413.1
PA	Philadelphia-SEPTA	PT	8,248.3	732.6	1,423.6	4.8	9,096.8
PA	Pittsburgh-PAT/ACCESS	PT	12,675.5	862.3	2,016.1	6.9	11,249.5
TX	Dallas-DART	PT	9,180.9	553.8	811.9	2.8	10,891.7
TX	Houston-Metro	PT	7,872.9	417.2	888.4	3.1	9,155.3
TX	San Antonio-VIA	DO	7,660.8	432.2	784.9	2.6	8,643.8
		PT	3,246.8	150.9	324.8	1.3	4,213.7
	Total		10,907.6	583.2	1,109.7	3.9	12,857.5
VA	Norfolk-TRT	DO	1,013.7	68.8	247.0	0.9	1,689.4
		PT	150.8	11.2	23.7	0.1	150.8
	Total		1,164.5	80.0	270.7	1.0	1,840.3
WA	Seattle-Metro	PT	3,636.6	235.4	619.1	2.2	4,694.7
WI	Milwaukee-Paratransit	PT	5,477.9	466.5	865.0	2.8	4,561.3
		DO Total	9,783.7	575.1	1,112.2	3.8	11,152.5
		PT Total	90,254.2	6,425.7	14,020.5	48.9	110,108.8
		Total	100,037.9	7,000.8	15,132.7	52.7	121,261.2
		Percentage of DO	13.8	11.9	8.1	7.3	10.2
		Percentage of PT	40.0	40.9	34.1	33.3	38.2
		Percentage of National Total	33.6	34.2	27.6	26.4	30.5

Performance measure indicators for Demand Response are displayed in **Exhibit 7-18**. The exhibit demonstrates that 9 of these 15 Demand Response agencies operated more efficiently than the national average in terms of service supplied based on cost per vehicle revenue mile. A majority of these agencies were not as cost effective as the national average based on cost per unlinked passenger trip and per passenger mile. Service effectiveness for the top 15 agencies is low, with only five better than the national average as measured by unlinked passenger trips per vehicle revenue mile. This low service effectiveness is expected given the fact that Demand Response service becomes less effective as the demand for this mode increases. This results from Demand Response's low capacity nature combined with its operational characteristics.

Data about infrastructure for Demand Response are displayed in **Exhibit 7-19**. It shows that 4,328 Demand Response vehicles are operated in maximum service by the 15 agencies presented. This represents 33.7 percent of all Demand Response vehicles operated nationally in maximum service.

Exhibit 7-18

Key Demand Response Performance Indicators of Transit Agencies 1995

Agency Name	Operating Expense				Passenger Trips		Passenger Miles	Vehicle Revenue Miles
	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Unlinked Passenger Trip (UPT)	Per Passenger Mile (PM)	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (MPH)
LA-OCTA	$3.00	$39.19	$12.01	$1.76	0.25	3.26	22.21	13.07
Ft. Lauderdale-Bct	2.22	44.27	12.02	1.41	0.19	3.66	31.46	19.92
Miami-MDTA	1.92	29.57	19.38	1.82	0.10	1.53	16.23	15.44
Honolulu-HDOT-Mayflower	2.67	37.07	14.35	1.18	0.19	2.58	31.53	13.89
Chicago-RTA-CTA	3.50	32.94	19.28	2.39	0.16	1.71	13.76	9.41
Chicago-RTA-Pace	2.15	31.70	9.64	1.69	0.22	3.22	16.75	14.73
Boston-MBTA	2.90	35.19	19.46	2.90	0.15	1.61	12.12	12.12
Philadelphia-SEPTA	2.99	33.64	17.31	2.71	0.17	1.94	12.42	11.26
Pittsburgh-PAT/ACCESS	1.81	26.63	11.39	2.04	0.16	2.34	13.05	14.70
Dallas-DART	1.92	31.78	21.68	1.62	0.09	1.47	19.67	16.58
Houston-Metro	1.36	25.62	12.03	1.17	0.11	2.13	21.94	18.67
San Antonio-VIA	1.79	33.57	17.64	1.52	0.10	1.90	22.05	18.70
Norfolk-TRT	1.89	27.46	6.11	1.19	0.23	3.39	23.02	14.56
Seattle-Metro	3.03	46.87	17.82	2.35	0.17	2.63	19.94	15.45
Milwaukee-Paratransit	1.58	18.55	10.00	1.90	0.16	1.85	9.78	11.74
Average of Agencies	$2.23	$31.84	$14.73	$1.84	0.16	2.24	17.64	14.16
National Average for Demand Response	$2.32	$33.55	$12.57	$1.74	0.18	2.67	19.38	14.50

Exhibit 7-19

Key Demand Response Infrastructure Characteristics of Transit Agencies 1995

ST	Agency Name	Operating Expense (000s)	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Average Fleet Age
CA	LA-OCTA	$14,091.9	191	242	4.9
FL	Ft. Lauderdale-Bct	10,124.7	163	440	3.8
FL	Miami-MDTA	16,770.0	187	248	1.4
HI	Honolulu-HDOT-Mayflower	9,563.4	174	224	3.4
IL	Chicago-RTA-CTA	24,492.7	766	776	0.8
IL	Chicago-RTA-Pace	14,787.1	323	393	3.1
MA	Boston-MBTA	15,712.6	274	296	4.2
PA	Philadelphia-SEPTA	24,640.3	275	359	2.4
PA	Pittsburgh-PAT/ACCESS	22,966.1	424	485	4.1
TX	Dallas-DART	17,601.4	200	233	3.2
TX	Houston-Metro	10,688.7	448	1,926	3.0
TX	San Antonio-VIA	19,577.7	216	231	2.4
VA	Norfolk-TRT	2,195.4	226	246	3.8
WA	Seattle-Metro	11,033.3	219	449	2.5
WI	Milwaukee-Paratransit	8,651.9	242	411	4.1
	Agencies Total	$222,897.3	4,328	6,959	
	Weighted Average				3.3
	Total Demand Response Mode	$689,466.4	12,825	18,280	
	Weighted Average				3.6

Trolleybus Agencies

Exhibits 7-20, 7-21, 7-22, and **7-23** provide data on the five Trolleybus agencies included in the NTD. This mode consists of rubber-tired vehicles supplied with electric power from overhead lines. The mode has remained relatively stable since 1990 in both service supplied and consumed. As seen in **Exhibit 7-20**, the San Francisco-Muni transit agency accounted for 54.9 percent of the vehicle revenue miles operated, 57.6 percent of the vehicle revenue hours, 66.8 percent of the Trolleybus riders carried, and 61.5 percent of the passenger miles realized.

Exhibit 7-20

Key Trolleybus Operating Characteristics of Transit Agencies
1995

ST	Agency Name	Type of Service	Operating Expense (000s)	Vehicle Revenue Miles (000s)	Vehicle Revenue Hours (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
CA	San Francisco-Muni	DO	$77,639.6	7,238.4	976.0	79,340.2	247.7	115,266.4
MA	Boston-MBTA	DO	7,092.6	745.1	57.3	3,429.4	12.1	9,208.0
OH	Dayton-RTA	DO	7,271.9	1,113.4	105.8	3,049.1	10.6	5,959.8
PA	Philadelphia-SEPTA	DO	10,851.7	913.2	111.9	9,723.7	34.5	15,691.2
WA	Seattle-Metro	DO	36,039.3	3,185.9	442.3	23,280.7	76.1	41,360.6
		Total	$138,895.2	13,196.0	1,693.4	118,823.1	380.9	187,486.0

Exhibit 7-21 shows that, San Francisco-Muni is generally the most cost effective Trolleybus system. Dayton also demonstrates a high level of efficiency.

Exhibit 7-21

Key Trolleybus Performance Indicators of Transit Agencies
1995

		Operating Expense				Passenger Trips		Passenger Miles	Vehicle Revenue Miles
ST	Agency Name	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Unlinked Passenger Trip (UPT)	Per Passenger Mile (PM)	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (MPH)
CA	San Francisco-Muni	$10.73	$79.55	$0.98	$0.67	10.96	81.29	118.10	7.42
MA	Boston-MBTA	9.52	123.75	2.07	0.77	4.60	59.83	160.66	13.00
OH	Dayton-RTA	6.53	68.71	2.38	1.22	2.74	28.81	56.31	10.52
PA	Philadelphia-SEPTA	11.88	96.98	1.12	0.69	10.65	86.89	140.22	8.16
WA	Seattle-Metro	11.31	81.49	1.55	0.87	7.31	52.64	93.52	7.20
	Average	$10.53	$82.02	$1.17	$0.74	9.00	70.17	110.72	7.79

As shown in **Exhibit 7-22**, the San Francisco-Muni transit agency operates 54.1 percent of the Trolleybus vehicles operated in maximum service. Seattle-Metro is the second largest agency with 26.1 percent of the Trolleybus vehicles operating in maximum service. Seattle-Metro also accounts for 27.4 percent of the Trolleybus directional route miles, compared with 31.9 percent for San Francisco-Muni and 25.1 percent for Dayton.

Uses of Capital funds for Trolleybus operators is shown in **Exhibit 7-23**.

Exhibit 7-22

Key Trolleybus Infrastructure Characteristics of Transit Agencies
1995

ST	Agency Name	Fixed Guideway Directional Route Miles	Vehicles Operated in Maximum Service	Vehicles Available in Maximum Service	Average Fleet Age
CA	San Francisco-Muni	131.5	263	366	16.5
MA	Boston-MBTA	21.6	23	50	19.0
OH	Dayton-RTA	103.4	26	39	17.9
PA	Philadelphia-SEPTA	42.5	47	75	16.0
WA	Seattle-Metro	112.6	127	165	13.1
	Total	411.6	486	695	
	Weighted Average				15.8

Uses of Trolleybus Capital Funds by Transit Agencies
(Thousands)
1995

ST	Agency Name	Rolling Stock (000s)	Facilities and Other (000s)	Total (000s)
CA	San Francisco-Muni	$1,016.6	$7,530.9	$8,547.5
OH	Dayton-RTA	1,964.3	2,776.6	$4,740.9
WA	Seattle-Metro	4.8	2,191.1	$2,195.9
	Total	$2,985.7	$12,498.6	$15,484.3

Ferryboat Agencies

Exhibits **7-24, 7-25, 7-26**, and **7-27** offer information on the nation's Ferryboat agencies included in the NTD.

Exhibit 7-24 shows that the Washington State Department of Transportation operating in Seattle reports over 51 percent of the vehicle revenue miles operated, nearly 48 percent of the vehicle revenue hours operated, 31.2 percent of the unlinked passenger trips, and 45.5 percent of the passenger miles.

Purchased transportation consumes 8.43 percent of the total operating expenses for Ferryboat and generates 23.7 percent of the total vehicle revenue miles.

Exhibit 7-25 reflects the high cost of Ferryboat service while showing its high service effectiveness. The Staten Island Ferry operated by the New York City Department of Transportation realized over 101 unlinked passenger trips per mile and over 1,059 unlinked passenger trips per hour.

Key Ferryboat Operating Characteristics of Transit Agencies 1995

Exhibit 7-24

ST	Agency Name	Type of Service	Operating Expense (000s)	Vehicle Revenue Miles (000s)	Vehicle Revenue Hours (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
CA	Oakland-AOFS	PT	$1,923.4	98.7	7.9	408.4	1.2	2,760.9
CA	Oakland-Vallejo Transit	PT	1,952.4	88.7	3.2	209.0	0.5	6,460.7
CA	SF-Golden Gate	DO	11,160.1	138.5	11.5	1,332.2	4.3	14,429.3
CT	Hartford-Conn DOT	DO	452.0	7.7	5.0	186.8	0.6	41.2
LA	New Orleans-Cresent City	DO	3,619.9	42.1	21.1	3,744.5	10.5	1,872.2
MA	Boston-MBTA	PT	4,707.6	99.6	7.6	864.7	3.1	6,457.7
ME	Portland-CBL	DO	1,947.2	75.0	15.3	746.3	2.3	2,537.3
NY	New York City DOT	DO	31,021.5	170.5	16.4	17,378.6	58.5	90,121.0
NY	Port Authority-PATH	PT	4,774.0	86.5	10.0	2,391.0	8.9	4,064.7
PR	San Juan-Port Authority	DO	6,146.2	50.4	10.6	1,050.1	2.9	1,575.2
VA	Norfolk-TRT	PT	531.6	11.9	6.1	483.7	1.1	241.9
WA	Bremerton-Kitsap Transit	PT	560.3	43.2	10.8	485.0	1.6	465.1
WA	Seattle-Washington DOT	DO	113,537.7	993.0	119.5	13,354.4	36.0	110,360.0
WA	Tacoma-Pierce Ferry	PT	861.1	30.8	4.7	159.9	0.4	1,167.2
		DO Total	$167,884.6	1,477.1	199.3	37,792.7	115.0	220,936.2
		PT Total	$15,310.4	459.4	50.3	5,001.7	17.0	21,618.1
		Total	$183,195.0	1,936.5	249.5	42,794.4	131.9	242,554.2

Key Ferryboat Performance Indicators of Transit Agencies 1995

Exhibit 7-25

		Operating Expense				Passenger Trips		Passenger Miles	Vehicle Revenue Miles
ST	Agency Name	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Unlinked Passenger Trip (UPT)	Per Passenger Mile (PM)	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (MPH)
CA	Oakland-AOFS	$19.49	$243.59	$4.71	$0.70	4.14	51.73	349.65	12.50
CA	Oakland-VallejoTransit	22.01	616.27	9.34	0.30	2.36	65.98	2,039.36	28.00
CA	SF-Golden Gate	80.60	974.68	8.38	0.77	9.62	116.35	1,260.20	12.09
CT	Hartford-Conn DOT	58.77	91.08	2.42	10.98	24.29	37.64	8.29	1.55
LA	New Orleans-Cresent City	86.05	171.89	0.97	1.93	89.01	177.80	88.90	2.00
MA	Boston-MBTA	47.26	616.50	5.44	0.73	8.68	113.24	845.69	13.04
ME	Portland-CBL	25.97	127.43	2.61	0.77	9.95	48.84	166.05	4.91
NY	New York City DOT	181.94	1,892.13	1.79	0.34	101.92	1,059.99	5,496.86	10.40
NY	Port Authority-PATH	55.19	479.80	2.00	1.17	27.64	240.30	408.51	8.69
PR	San Juan-Port Authority	122.02	580.65	5.85	3.90	20.85	99.21	148.81	4.76
VA	Norfolk-TRT	44.66	87.25	1.10	2.20	40.64	79.39	39.70	1.95
WA	Bremerton-KitsapTransit	12.98	51.82	1.16	1.20	11.24	44.86	43.02	3.99
WA	Seattle-WashingtonDOT	114.33	949.72	8.50	1.03	13.45	111.71	923.14	8.31
WA	Tacoma-PierceFerry	27.95	183.41	5.39	0.74	5.19	34.05	248.60	6.56
	Average	$94.60	$734.16	$4.28	$0.76	22.10	171.50	972.04	7.76

Exhibit 7-26 again demonstrates the significance of the Washington State Department of Transportation's Ferryboat service in terms of infrastructure. Over 35 percent of the vehicles operated in maximum service are reported by this agency.

Uses of Capital funds for Ferryboat operators is shown in **Exhibit 7-27**.

Automated Guideway Agencies

Information concerning the four Automated Guideway agencies is given in **Exhibit 7-28**. Miami has the highest share of operating expenses, service supplied, and consumed, followed by Detroit.

Exhibit 7-26

Key Ferryboat Infrastructure Characteristics of Transit Agencies
1995

ST	Agency Name	Fixed Guideway Directional Route Miles	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Average Fleet Age
CA	Oakland-AOFS	30.5	3	4	9.5
CA	Oakland-Vallejo Transit	79.6	1	1	4.0
CA	SF-Golden Gate	38.7	4	4	21.8
CT	Hartford-Conn DOT	0.9	2	2	43.0
LA	New Orleans-Cresent City	3.0	5	6	24.6
MA	Boston-MBTA	10.6	7	9	18.6
ME	Portland-CBL	20.0	4	5	15.2
NY	New York City DOT	10.4	4	7	19.4
NY	Port Authority-PATH	3.4	4	5	5.4
PR	San Juan-Port Authority	3.0	2	9	10.3
VA	Norfolk-TRT	1.0	2	3	7.0
WA	Bremerton-Kitsap Transit	31.5	5	6	33.8
WA	Seattle-Washington DOT	245.8	24	24	30.2
WA	Tacoma-Pierce Ferry	11.1	1	2	30.5
	Total	489.5	68	87	
	Weighted Average				21.2

Exhibit 7-27

Uses of Ferryboat Capital Funds by Transit Agencies
(Thousands)
1995

ST	Agency Name	Rolling Stock (000s)	Facilities and Other (000s)	Total (000s)
CA	SF-Golden Gate	0.0	795.6	$795.6
LA	New Orleans-Cresent City	352.5	48.3	$400.8
ME	Portland-CBL	13.0	26.8	$39.8
NY	New York City DOT	1,107.3	2,082.9	$3,190.2
NY	Port Authority-PATH	0.0	56.0	$56.0
PR	San Juan-Port Authority	467.1	407.3	$874.4
VA	Norfolk-TRT	1,234.5	686.6	$1,921.1
WA	Seattle-Washington DOT	37,244.8	32,304.9	$69,549.7
WA	Tacoma-Pierce Ferry	0.1	369.4	$369.5
	Total	$40,419.4	$36,777.8	$77,197.2

Performance measures for Automated Guideway systems are displayed in **Exhibit 7-29**. The efficiency (cost per revenue mile) of these systems correlates to the amount of service supplied. The agencies with the poorest efficiency are Miami and Detroit, and they are the greatest providers of Automated Guideway service. The system in Tampa displays the best service effectiveness among Automated Guideway agencies.

Key Automated Guideway Operating Characteristics of Transit Agencies 1995 **Exhibit 7-28**

ST	Agency Name	Type of Service	Operating Expense (000s)	Vehicle Revenue Miles (000s)	Vehicle Revenue Hours (000s)	Unlinked Passenger Trips (000s)	Average Weekday Unlinked Passenger Trips (000s)	Passenger Miles (000s)
FL	Jacksonville-JTA	DO	$712.6	75.7	5.3	282.1	1.0	163.2
FL	Miami-MDTA	DO	11,390.3	706.6	64.8	4,325.6	13.2	4,456.0
FL	Tampa-Hartline	PT	98.0	36.2	9.7	348.7	1.0	150.0
MI	Detroit-DTC	DO	7,169.3	335.9	29.0	1,871.3	5.2	2,659.2
		DO Total	$19,272.2	$1,118.2	$99.1	$6,479.1	$19.4	$7,278.4
		PT Total	$98.0	36.2	9.7	348.7	1.0	150.0
		Total	$19,370.2	1,154.4	108.8	6,827.7	20.4	7,428.5

Key Automated Guideway Performance Indicators of Transit Agencies 1995 **Exhibit 7-29**

		Operating Expense				Passenger Trips		Passenger Miles	Vehicle Revenue Miles
ST	Agency Name	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Unlinked Passenger Trip (UPT)	Per Passenger Mile (PM)	Per Vehicle Revenue Mile (VRM)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (VRH)	Per Vehicle Revenue Hour (MPH)
FL	Jacksonville-JTA	$9.42	$135.32	$2.53	$4.37	3.73	53.57	30.99	14.37
FL	Miami-MDTA	16.12	175.68	2.63	2.56	6.12	66.72	68.73	10.90
FL	Tampa-Hartline	2.71	10.05	0.28	0.65	9.64	35.78	15.40	3.71
MI	Detroit-DTC	21.34	247.64	3.83	2.70	5.57	64.64	91.85	11.60
	Average	$16.78	$178.04	$2.84	$2.61	5.91	62.76	68.28	10.61

Infrastructure data for Automated Guideway agencies are shown in **Exhibit 7-30**. It shows that Automated Guideway systems have limited infrastructure and serve small portions of the metropolitan areas where they are located. Miami is the system with the highest amount of fixed guideway directional route miles and vehicles operated in maximum service.

Key Automated Guideway Infrastructure Characteristics of Transit Agencies 1995 **Exhibit 7-30**

ST	Agency Name	Fixed Guideway Directional Route Miles	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Average Fleet Age
FL	Jacksonville-JTA	1.2	2	2	6.0
FL	Miami-MDTA	8.5	20	29	4.9
FL	Tampa-Hartline	0.9	2	2	10.0
MI	Detroit-DTC	2.9	6	6	9.0
	Total	13.5	30	39	
	Weighted Average				6.3

Uses of Capital funds for Automated Guideway operators is depicted in **Exhibit 7-31.**

Exhibit 7-31

Uses of Automated Guideway Capital Funds by Transit Agencies
(Thousands)
1995

ST	Agency Name	Rolling Stock (000s)	Facilities and Other (000s)	Total (000s)
FL	Jacksonville-JTA	$5,022.8	$21,787.0	$26,809.8
FL	Miami-MDTA	0.0	12,696.6	$12,696.6
MI	Detroit-DTC	6,589.2	0.0	$6,589.2
	Total	$11,612.0	$34,483.6	$46,095.7

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